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# The International Journal of Orthodontia

Editor: Martin Dewey, D.D.S., M.D.

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VOL. II

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## ORIGINAL ARTICLES

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### FACE FACTS

(Continued from page 197.)

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**F**OLLOWING our brief outline of the anomalies of dentition (which should form the basis of any rational diagnostic scheme), it may not be amiss to give a short review of some of the theories advocated for critical study of the facial deformities which complicate malocclusions.

A knowledge of their pathology is admittedly of fundamental importance; it reveals the *internal structure* of these malformations. But since they include the most conspicuous external area of the body, we are compelled to consider, if only briefly, that most remarkable and characteristic problem of esthetics, namely, *beauty of form*.

In his study on "*The Nature of Beauty*" Professor Santayana has very aptly said that "*The philosophy of beauty is a theory of values.*" Continuing he says:

"It would be easy to find a definition of beauty that should give in a few words a telling paraphrase of the word. We know on excellent authority that beauty is truth, that it is the expression of the ideal, the symbol of divine perfection, and the sensible manifestation of the good. A litany of these titles of honor might easily be compiled, and repeated in praise of our divinity. Such phrases stimulate thought and give us a momentary pleasure, but they hardly bring any permanent enlightenment. A definition that should really define must be nothing less than the exposition of the origin, place and elements of beauty as an object of human experience. We must learn from it as far as possible, why, when, and how beauty appears, what conditions an object must fulfill to be beautiful, what elements of our nature make us sensible of beauty, and what the relation is between the constitution of the object and the excitement of our sensibility. Nothing less will make us understand what esthetic appreciation is."

It is obvious that we are thus involved in a very difficult subject, which probably explains the lack of unanimity among our leaders; and we need not be surprised, therefore, to find several schools of thought promulgating conflicting rules for our guidance in practice. "Long before we can attain the ideal unification of experience under one theory, the various fields of thought demand provisional surveys." Hence it may be no misfortune to maintain that "*a rational harmony*

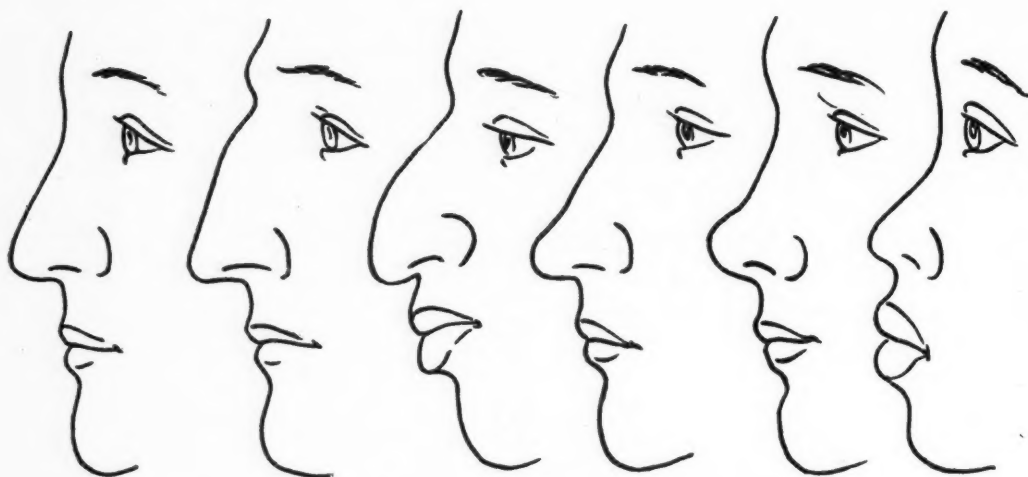


Fig. 26.—Nasal variations affecting the profile.

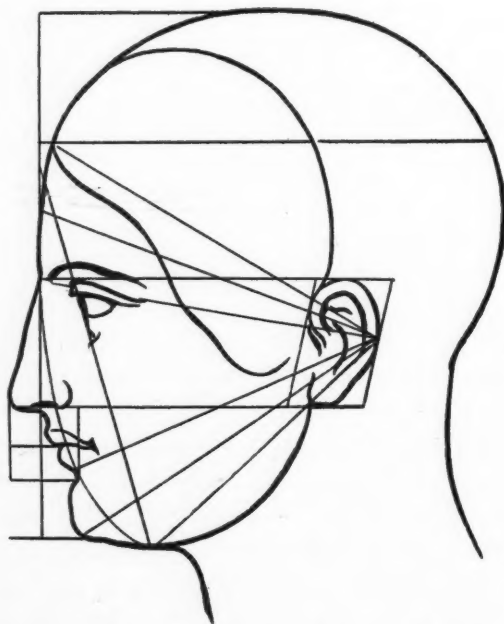


Fig. 27.—Wiegall's method for determining profile proportions.

*exists between beauty and utility*" (however difficult it may be to establish such a theory as a philosophic principle), because our experience certainly teaches us "*the dangers of indeterminateness.*" Besides, it is so wholly human to cling to seeming bounds.

## VI. ORTHODONTIC CONCEPTIONS AND IDEALS.

Esthetics has been defined as the science of the beautiful. In attempting to represent different phases of mental conception, students of the fine arts have formulated numerous methods for determining the proportions of the human form. The lines of division shown in Fig. 27 show a method suggested by Wie-gall.

Raymond is of the opinion that "probably half the people in the world, without ever having been aware of it, have been in the habit of perceiving" human faces in some such manner. "In other words, they have been in the habit, when looking at a face, of comparing, mentally, the distance between the chief line of the eyebrows and of the eye, with the distance between the nostrils and the mouth, and also of comparing, above and below these narrower spaces, the wider distances between the hair and the eyebrows, the eyes and the nostrils, and the mouth and chin" (Fig. 28).



Fig. 28.—Raymond's method.



Fig. 29.—Farrar's method.

The mere fact that orthodontics embraces remedial measures with which facial deformities may be corrected, predicates the need for a criterion, or rule, for our guidance. "The duties of an orthodontist force upon him great responsibilities, and there is nothing in which the student of orthodontia should be more keenly interested nor better informed than in the study of the artistic proportions and relations of the features of the human face; for each of his efforts, whether he realizes it or not, makes for beauty or ugliness, for harmony or inharmony, for perfection or deformity" (Angle). Ignorance of these facts has frequently been the cause of failures which might easily have been avoided. To permanently mar a human face is an accomplishment which few covet.

In the works of Kinsley, Farrar, etc., we perceive that the need for a rule as an aid in diagnosis was plainly felt. Farrar adopted the classical profile of Apollo as a cover-design for his work on "Irregularities of the Teeth" (Fig.

29). It will be noticed that he drew a perpendicular line across this profile which touched the frontal eminence and bisected the ala of the nose. The mentum, or chin, did not quite come into contact with this line.

In Chapter II of the so-called "Sixth Edition" of Angle's "Malocclusion of the Teeth," we again note this profile drawing, though slightly altered (Fig. 30). In the description of this drawing Angle said: "In studying the perfection of the profile it will be seen that it is in perfect harmony with a straight line at three points,—namely, the most prominent points of the frontal and mental eminences and the middle of the ala of the nose. As a convenience we shall call this the *line of harmony*. It will be found of great value as a basis



Fig. 30.—Method formerly employed by Angle.

of diagnosis,\* serving the same purpose in the esthetics of the face as does the line of occlusion in indicating the variations of the teeth from the normal alignment."

In a subsequent edition of his work, Angle freely admits the fallacy of the above, for he says:

"We know while all human faces are greatly alike, yet that all differ. Lines and rules for their measurement have ever been sought by artists, and may have been the plans for determining some basic line or principle from which to detect variations from the normal, *but no line, or measurement, admits of anything nearly like universal application.*"\*

"The beautiful face of the Apollo Belvidere has been very largely used as a guide toward the ideal and from which to judge variations, but this is impracticable and misleading, for, notwithstanding the beautiful harmony of proportions of that face, with its straight line touching the frontal and mental eminences and the middle of the wing of the nose,<sup>†</sup> its range of application has

\*Italics are mine.

†In a paper read before the National Dental Association in 1901, the late Dr. Goddard disproved this.

been found to be very limited in gauging the harmony or inharmony of other faces."

"And this is not surprising when we realize that the Apollo face represents the ideal of the Greek type and the Greek type only, and that we today see not only very few faces of a purely Grecian type, but for that matter, very few of any pure type, unless it be an occasional Roman."

"In the early days artists dealt wholly with pure types, as is unmistakably shown in their works that have come down to us. In Grecian art, both painting and sculpture, the faces all conform to the Apollo type, and the type was constant because the blood of the people was pure, that is, comparatively free from admixture with races of different types."

He then quotes Professor E. H. Wuerpel, dean of the Washington University Art School, as follows:

"The ideal of the Roman type, though markedly different from the Grecian, was also closely followed by their painters and sculptors, and where types and religious ideals were so distinctive and so closely adhered to there could be certain standards and laws to govern them, especially in creative art; but to use the Grecian or the Roman standard as a gauge for the types for the present day, especially in America, is impracticable, for our inheritance, our occupations, our mental activities, our habits of thought, our social and climatic conditions, etc., etc., differ so radically, and all these play such a vital part in the molding of the mental, moral and physical, as expressed in our whole bodies and especially in our faces, that a standard type is an impossibility. The tendency of modern civilization seems to be to create a law for each individual, and in the face of complex and constantly changing conditions a fixed type as a basis or standard to govern the molding of the human face cannot be established."

Continuing, Angle says:

"This may all seem discouraging to the orthodontist, but there is a principle, which intelligently applied brings us the nearest to an ideal result possible with each given patient—that of balance, of symmetry. We should be able to detect not whether the lines of the face conform to some certain standard, but whether the features of each individual—that is, the forehead, the nose, the chin, the lips, etc.—balance, harmonize, or whether they are out of balance, out of harmony, and what concerns us most as orthodontists: whether the mouth is in harmonious relations with the other features, and if not, what is necessary to establish its proper balance."

"Now, the ability to determine the proper balance of the features is rare. One of our foremost teachers of art, Mr. E. H. Wuerpel, says that only one in two or three hundred of even art students ever succeed in mastering it, and these only after much observation and practice in sketching and modeling the human face. Yet discouraging even as this seems we believe there is a law for determining the best balance of the features, or at least the best balance of the mouth with the rest of the features, which artists probably know nothing of, and one which for our work is far more unvarying and more reliable than even the judgment of the favored few. It is, furthermore, a law so plain and so simple that all can understand and apply it. It is that the best balance, the

best harmony, the best proportions of the mouth in its relations to the other features require that there shall be *the full complement of teeth, and that each tooth shall be made to occupy its normal position—normal occlusion.*"

"The correctness of this rule will be better appreciated if we will but remember that in those cases where nature has succeeded in building a normal denture—teeth in normal occlusion—she has also succeeded in building it so as to be in best harmony with the lines of the face, or, conversely, the lines of the face to best harmonize with this denture, and that the teeth in these cases are noticeable marks of beauty. And as malocclusion is but the perversion of normal occlusion, it invariably will be noticed that inharmony in the balance of the mouth with the rest of the lines of the face exists just in proportion to the extent of the malocclusion."

"This law may be regarded as one of the corner-stones of the new school of orthodontia in contradistinction to the teaching that has always dominated the practice of the old school—that of leaving to the individual judgment of the operator, without any standard, the determination of the requirements in orthodontic operations in each given case."

"To satisfy this individual judgment extraction was often, and in complex cases always, resorted to. Its unfortunate and inartistic results may be seen in every community. It is gratifying to note, however, that this fallacious teaching and pernicious practice are rapidly passing and will doubtless soon become mere matters of history."

Expressed differently, Angle maintains that the outward form of the changeable area of the face is dependent upon the relative normality of the denture within; and that, as a rule, it is best to establish normal occlusion (which implies the presence of each tooth), and thus strike a balance which is rarely wrong. Theoretically, this is not absolutely true; and it can hardly be called a law, using the word in its scientific sense.

In other words, it is true because it ought to be true; and if we would limit our treatments to young children in the developmental period, the normal growth of malformed structures surrounding the teeth would probably always follow. The profile of a growing child must never be considered as a fixed line (at least not immediately after tooth movement has been accomplished), but one in which further changes will continue to take place.

I have already stated that we need not be surprised if we find various schools of thought promulgating conflicting rules for our guidance in practice. The above quotations from Angle contain the gist of his attitude on this subject, and, so far as the writer is aware, his latest teachings. But before passing to the views of a leader like Case, whose findings are in many respects diametrically opposed to Angle, I would like to call the reader's attention to the following significant statement, which appears on page 74 of Angle's last edition.

"The author would not be understood as intending to imply that every face with lines and features in harmony of balance must necessarily be beautiful, not even that placing maloccluded teeth in normal occlusion will establish harmony of balance of every face in its entirety. There may be other defects such as the lack of development of the nose or chin, or unequal development of the two malar bones, or of any of the bones of the face, etc. These defects of course

could not be remedied by the correction of malocclusion, but the best harmony of such faces or of any face is only possible when the teeth are in normal occlusion."

In other words, he, too, admits that "*there may be other defects such as lack of development of the chin, \* \* \* or of any of the bones of the face,*" etc. And, "*These defects of course could not be remedied by the correction of malocclusion, etc.*"

A large experience and much careful observation have led Professor Case to formulate the following principles:

"The portion of the human face that it is possible to change with dental regulating apparatus may be said to lie between diverging lines which arise at

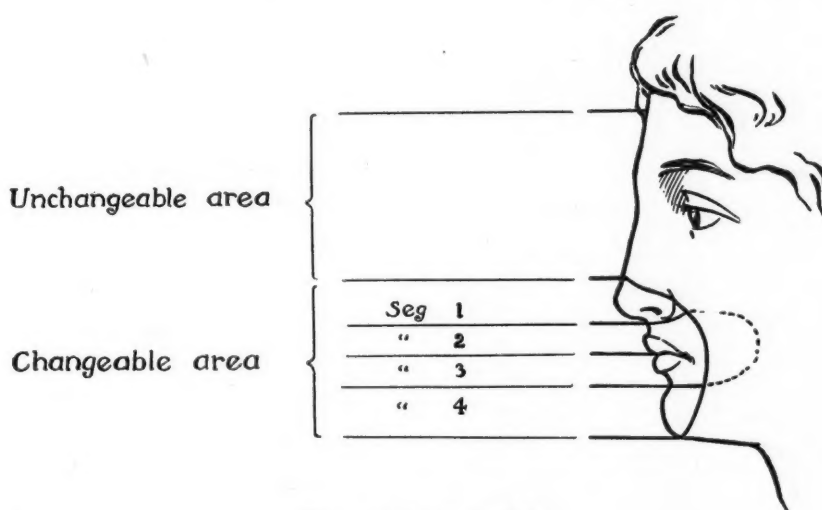


Fig. 31.—Case's method.

a point below the ridge of the nose and curve downward to enclose the alæ and depressions on either side; thence laterally to encircle a portion of the cheek, and downward to enclose the entire chin (Fig. 31). This area may be termed the *changeable area* in contradistinction to the more stable features, or *unchangeable area*. For convenience of ready reference, the features in that portion of the changeable area which are bounded laterally by the nasolabial lines may be divided into segments, as follows:

"Segment 1. The end of the nose and the upper portion of the upper lip, including the nasolabial depressions.

"Segment 2. The lower portion of the upper lip.

"Segment 3. The lower lip.

"Segment 4. The chin.

"These four segments are changeable in their relations to each other, and also in their individual relation to features in the unchangeable area."

Dr. Case further maintains that the relations of these areas to each other must be determined prior to treatment by *the trained eye of the operator*, and the deviations, if any, noted. Following this, the treatment must be planned so as to produce the best possible exterior effects or contour of these parts. In

other words, the operator's ideal of facial form is the standard, or criterion, he would have us accept. It is presumed, of course, that this be a cultivated ideal, carrying with it that fine discretionary ability to say when teeth shall be extracted, or moved bodily, for the improvement of facial balance. According to this author, the full complement of teeth is not necessary in the treatment of certain types of malocclusion; in some instances extraction of one or more teeth is positively indicated.

Theoretically, this is certainly true, because "Beauty of form cannot be reduced to beauty of elements. All marble houses are not equally beautiful." Similarly, all profiles, even though they are moulded over an ideal occlusion of all the permanent teeth, are not equally beautiful. "All ideal forms have an emotional tinge. Beauty of form is due to expression, and all expression, ultimately, is something else than beauty—some practical or moral good." For



Fig. 32.—Shows the unrelatedness of beauty of form to elements. (Santayana.)

example, "take the ten meaningless short lines in Fig. 32 and arrange them in the given ways intended to represent the human face; there appear at once notable different esthetic values. Two of the forms are differently grotesque, and one approximately beautiful. These effects are due to the *expression* of the lines; not only because they make one think of fair or ugly faces, but because, it may be said, these faces would in reality be fair or ugly according to their expression, according to the vital and moral associations of the different types." (Santayana.)

#### VII. CLINICAL DIAGNOSTIC AIDS.

It must be obvious to the reader that, if possible, it would be desirable to ascertain in advance the probable effect of the treatment upon the patient's facial lines. Fortunately, in a limited number of types, we are able to estimate the result in a fairly accurate manner. For example, let us take a case of *neutroclusion* complicated by linguoversion of the upper and lower incisors (Fig. 33, a). Pieces of softened wax may be moulded over the occluded models and trimmed to a form approaching the future alinement of these teeth (Fig. 33, b). After the wax is washed in cold water it is placed in position on the

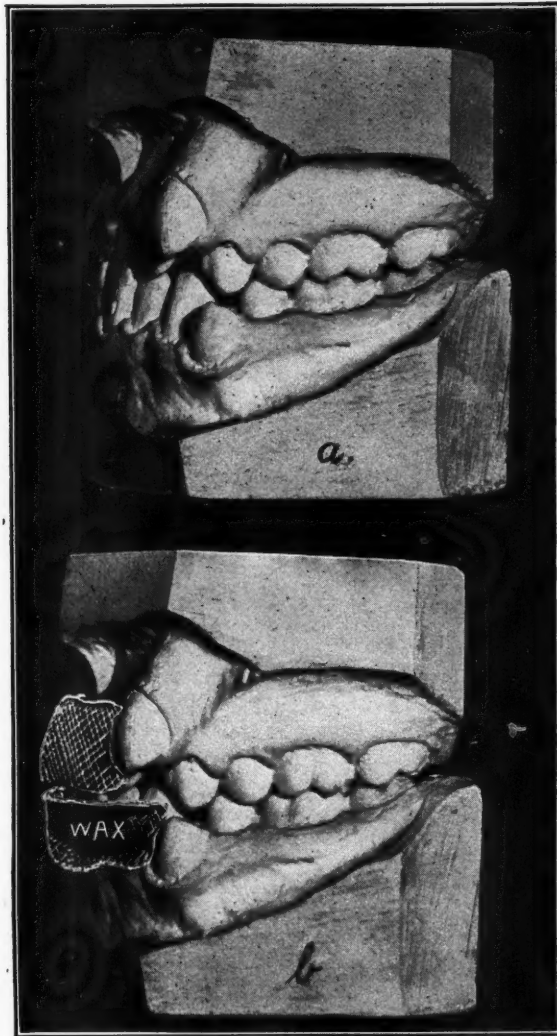


Fig. 33.—Shows the author's method for estimating in advance the probable effect of an orthodontic treatment; compare with Fig. 34. (From Lischer's Orthodontics, courtesy of Lea & Febiger.)

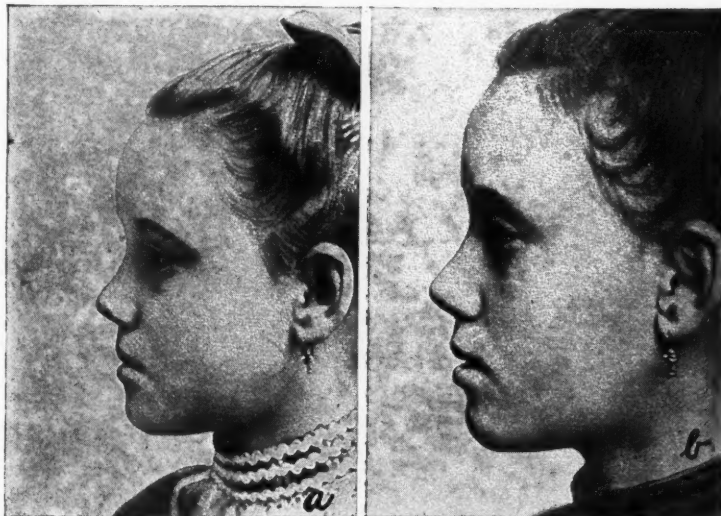


Fig. 34.—Photographs of the patient before and after the use of the wax model shown in Fig. 33,b.

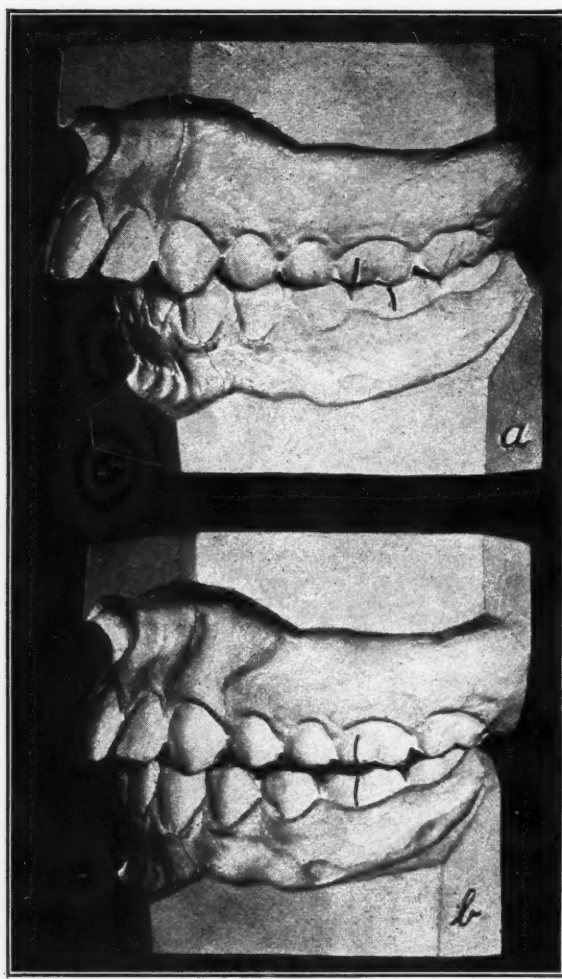


Fig. 35.—Method employed in *distoclusions*; compare with Fig. 36, *a* and *b*. (Courtesy of Lea & Febiger.)



Fig. 36.—Photographs of patient shown in Fig. 35, *a* and *b*; note change in profile in *b*. (Courtesy of Lea & Febiger.)



Fig. 37.—Same method as in Fig. 35, *a* and *b*; compare with Fig. 38. (Courtesy of Lea & Febiger.)

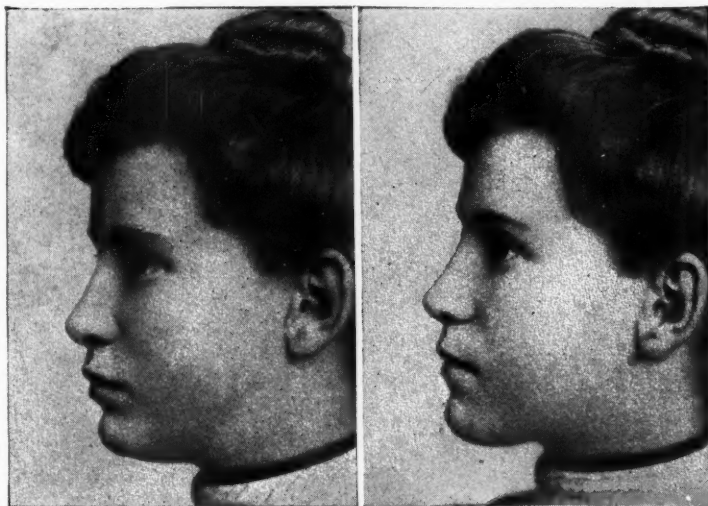


Fig. 38.—Photographs of case shown in Fig. 37. (Courtesy of Lea & Febiger.)

teeth. The patient is now asked to relax all tension of the lip muscles, which allows the facial lines to assume the form which the treatment will in all probability produce (Fig. 34, a and b). In cases where only the upper incisors are in linguoversion, the amount of wax employed is accordingly reduced.

In *distoclusion* complicated by labioversion of the upper incisors the patient may be asked to bite mesially so as to bring the first molars into a normal mesio-distal relationship (Fig. 35, a and b). Fig. 36 (a and b), shows photographs of the patient taken with the teeth in the positions shown in Fig. 35. In b, Fig. 36, the patient is shown to be conscious of the effort, a defect which a successful treatment would remove. But it at least demonstrates that if the lower arch is moved forward on its osseous base, a noticeable improvement in the lower lip and mentolabial sulcus will follow. It is also a good method for demonstrating to parents the fallacy of regarding the labioversion of the upper incisors as the primary pathological condition.

Similar preliminary studies can be made of patients presenting a distoclusion complicated by linguoversion of the upper central incisors (Fig. 37, a and b; Fig. 38, a and b). This type is frequently further complicated by infraversion of the molars and bicuspid, and supraversion of the incisors (Rogers), and occasionally results in mandibular micrognathia and mandibular retroversion (Federspiel), as we shall note in detail later. For studies of such cases, Dr. Case has suggested a temporary "opening of the bite" (*Dental Orthopedia*, p. 323). If necessary, generous pieces of modeling compound, or wax, may be inserted between the occlusal surfaces of the bicuspid and molars to prevent complete closure, and while in this position a study of the profile can be made.

Unfortunately, in mesiocclusions, and in many of the more serious forms of dento-facial deformity, these methods are inapplicable.

(To be continued.)

## MODERN OFFICE APPOINTMENT FOR THE ORTHODONTIST

By R. C. WILLETT, D.M.D., PEORIA, ILLINOIS.

### SECTION II.

IT is the purpose of this section to show the foundation, fact and reason upon which men of our profession should make plans for a well-kept, well-decorated and well-appointed office suite. This section will also contain certain definite suggestions regarding the practical planning and fitting out of office rooms, and will contain, as illustrations of the points which are recited, the floor plan and reproductions of interior photographs of an office suite which has been planned and put into effect. Personally the writer claims no authority as a psychologist, art critic, color expert, architect or furniture connoisseur. However, the statements which will be made on these and other subjects in this section are not without authority.

The offices of professional men are like the individual men who occupy them. Consciously or unconsciously we write our training, experience, knowledge and some of our habits into the appointment, the furnishings and the appearance of our offices.

Are we men of orderly habits? Then our offices will tell it. Are we seekers after personal glory and personal advertisement? Then this will manifest itself. Are we appreciative of art? Then there will be art in the arrangement and in the things found in our offices. Are we uncultured, narrow, selfish, bigoted, grasping or self-centered? Then these will express themselves in some manner. Are we really deeply interested in helping the children of this generation grow up into perfect specimens of manhood and womanhood—well balanced physically, mentally and morally? If we are, this interest will be reflected in no small degree in the offices which we occupy—the dumb walls, voiceless furniture, and the very magazines, pictures, paintings, books and general atmosphere will tell the people that the man who occupies the office is definitely interested in the welfare of the children.

These statements are not real fancies. They are in accord with the most accepted theories of psychology. "Houses are like the individuals who inhabit them," said Victor Hugo. "If you are a good man, and true, your castle will show it," said the great Aristotle in his "De Anima." "In whatever man does, on work or play, he expresses his ideals," says William T. Harris. "Do not try to hide your thoughts," said the great Hume, "for they speak loudest when your voice is still. The quarters which you build around you express your character and your thoughts perhaps better than could your meager words." "We write in large hand our likes and dislikes on the floors, walls and make-up of our houses, and we are to be measured accordingly," says Fred Hamilton Daniels.

This testimony of the psychologists is corroborated by our own experience. We admit that any imperfections which exist in our office appointments, correspond with a certain lack of knowledge in our individual make-up; and the



with no appreciation of children will hardly provide the best children's literature for the use of the young folks who come into his office as patients.

However, there is a solution for these situations. Not in securing a professional decorator to take all of this work off our hands and to equip our office—for that would be only a partial solution. The individual, by a comparatively small amount of study or direction, can acquire sufficient knowledge of these things so that he can intelligently and satisfactorily answer the problems himself. If he decides then to call in a professional decorator to assist him, then that is proper. But unless the individual has sufficient knowledge to express something of his own personality and individuality in his office improvements



Fig. 2.—Corner of reception room opposite main entrance from corridor.

a professional decorator can be of little valuable service. The only instance when a professional decorator could successfully handle the whole situation for a man who himself is not capable of expressing his own individuality in his office appointments is where this professional decorator is a psychologist who can read the professional man's mind and determine the environment in which this man would be best suited. But was there ever such a decorator?

Individuality and personality are absolutely essential to a well appointed office. Ruskin, who is as great an authority on art and social reform as the world has produced, has the following to say in his book, "The Two Paths:" "It is not only possible, but a frequent condition of human action, to DO right

and BE right—yet so as to mislead other people if they rashly imitate the thing done. For there are many rights which are not absolutely, but relatively right—right only for THAT person to do under those circumstances,—not for THIS person to do under other circumstances.”

While it might appear that an exceptional natural knowledge of art and proportion might be necessary in order to be qualified to properly appoint an office—this is not the case. “A natural knowledge of any particular art is rare,” said Platem, “but it is given to nearly everyone to cultivate a taste for this art.” Each art is bound up in various puzzling rules and laws which ap-



Fig. 3.—End of reception room leading to the business lobby.

pear like barbed wire fence to keep out intruders. But the barricades are in reality only trifles.

Professional men who have attempted modern office furnishing often make the mistake of giving themselves over entirely to the professional equipment salesman. Are we going to make our office appointment carry the appearance of purchased refinement? If we do, then there will be a lack of harmony between ourselves and our surroundings. While these conditions may not be analyzed by the people who visit our office suite, there will be an indescribable void in our office—that genuineness would be missing which would otherwise be in evidence if our own personality had entered into the plans and appointments.

Although our offices should be expressive of ourselves, there is possible the mistake of making our offices appear to over-advertise the man who occupies them. This is perhaps as great an error as that of leaving out our individuality and personality in the appointing of our rooms. Few things in office equipping are more revolting to an esthetic mind than those which continuously seem to force thoughts of the individual professional man upon the people who come to the office for treatment or counsel. In such offices the pictures and other decorative features appear to be always shouting the praises of the owner.

The real objects of having well appointed, nice appearing and well kept



Fig. 4.—Corner of business lobby showing the assistant's desk and view of reception room as shown in Fig. 3.

offices should be constantly in mind when we are preparing our rooms. Offices should be made comfortable, attractive and pleasing, not for any financial benefit which might follow. This is something which should be positively guarded against. Just as soon as professional men as a group or as individuals begin to evolve artistic planning of their offices into means for "money sucking" and exploiting the public, just so soon will the true purpose of our professional life be lost. Our offices should be well appointed for the plain purpose of making life more livable and real through the practical use of material things insofar as these will apply to life. Well appointed offices will do a double service—make our own individual lives brighter and more serviceable, and a benefit to the people who come to our offices.

The office plan shown in Fig. 1 is one which has been put into effect by the writer. It is cited here not as a model but as an example upon which to base future remarks so that there will be common ground for discussion.

The space occupied by this office is one to be found in any office building. There are no special natural light advantages. The office is not on a corner, gaining light only from one side except for the small amount which is gained from the corridor in the building. It is not over large or small and the rental is such as should easily be afforded by an orthodontist of five years' practice.

The office is divided into the following rooms: Reception, business lobby,



Fig. 5.—Private office showing desk on the right side and model library case (closed) on the left.

two operating rooms, private office, laboratory, retiring room, and private exit. Each of these rooms is considered absolutely necessary to a well planned office.

The proportionate space occupied by the several rooms appears to be generally satisfactory. The utilization of every foot of space has also been worked out and the rooms are so arranged that few unnecessary steps are required in getting from one room to another. For example, the private office is shortened, without making it too small, so as to allow a straight line between the doors of the two operating rooms. There is also a direct route between both operating rooms and the laboratory.

The convenience of operating room No. 2 to the laboratory is that impression material may be prepared by the assistant and passed through the

swinging panel windows. Likewise, impressions and other things passed back to the laboratory.

The laboratory is lighted by artificial light when necessary and the windows let in direct air and direct light from the operating room. Other features of the office plans will be mentioned in the following brief description of the various rooms—taken in the order that they would be utilized in practice.

The reception room is a place where people may be at ease until they are wanted elsewhere. The essential requisites of this room are comfortable seating places. These seating places should be substantial—not only for their ap-



Fig. 6.—A view of two operating rooms and private office.

pearance but for the fact that children occupy them. While a child, like the adult, might admire the beauty of a delicate piece of bric-a-brac furniture, he will feel more at ease in the use of that which is comfortable and at the same time indestructible. Removable seats in chairs are out of place in an office. There is no necessity or reason for having a center or side table in the reception room. Such a table has no reason for existence in a reception room except that custom generally places it there. A table is generally misused by being a place to cover with wraps, books, magazines, or parcels which may have been brought in. For this reason it should be left out of the office scheme.

Of secondary importance in the reception room is that which contributes to both physical and mental ease—literature and decorations. Weekly maga-

zines of a sensational nature should be avoided. Substantial and readable children's magazines should be in evidence—bound with a patent magazine cover-binder makes them unusually serviceable and keeps them readable for a long period. Magazines and books pertaining to birds are particularly attractive to young people. These magazines and books, be it remembered, are kept in a rack of some kind, easily accessible.

The importance of good pictures and other art work for the reception room cannot be over-emphasized. Good pictures give an opportunity of looking out beyond the confines of the four walls. They never wear out. With each



Fig. 7.—View of doors shown in Fig. 6 closed. These form one side of the business lobby.

succeeding glance the good picture or painting grows in power—giving new ideas, new lessons and new thoughts. A poor picture is worth less than nothing. "Nothing grows older in an office quicker than a poor picture," says Frank A. Parsons. They can be read at a single glance. The educational value of good pictures is only now beginning to be fully realized.

In this connection the writer would make a side remark that the professional man would be of much more service to humanity—and at no financial sacrifice to himself—if he would buy more works of real art and merit and fewer of the things of personal adornment for himself or for idle indulgence that is soon forgotten. A diamond worn in a scarf pin or in a shirt stud may give the wearer some satisfaction, but nobody else benefits from it. A picture, on the

other hand, is just as staple a commodity (provided discretion is used in its selection and purchase) and it pleases not only the buyer but practically all the people who come in contact with it. Why not invest, now and then, in a real example of modern fine arts? Viewing it as an investment, if properly made through reputable dealers, the value is there as certain as it would be if invested in diamonds, the possession of which and the wearing of which more often denotes ostentation. The possession of real art never does this, as the mind of the person who is attracted and inspired by it does not ordinarily connect the owner with it.

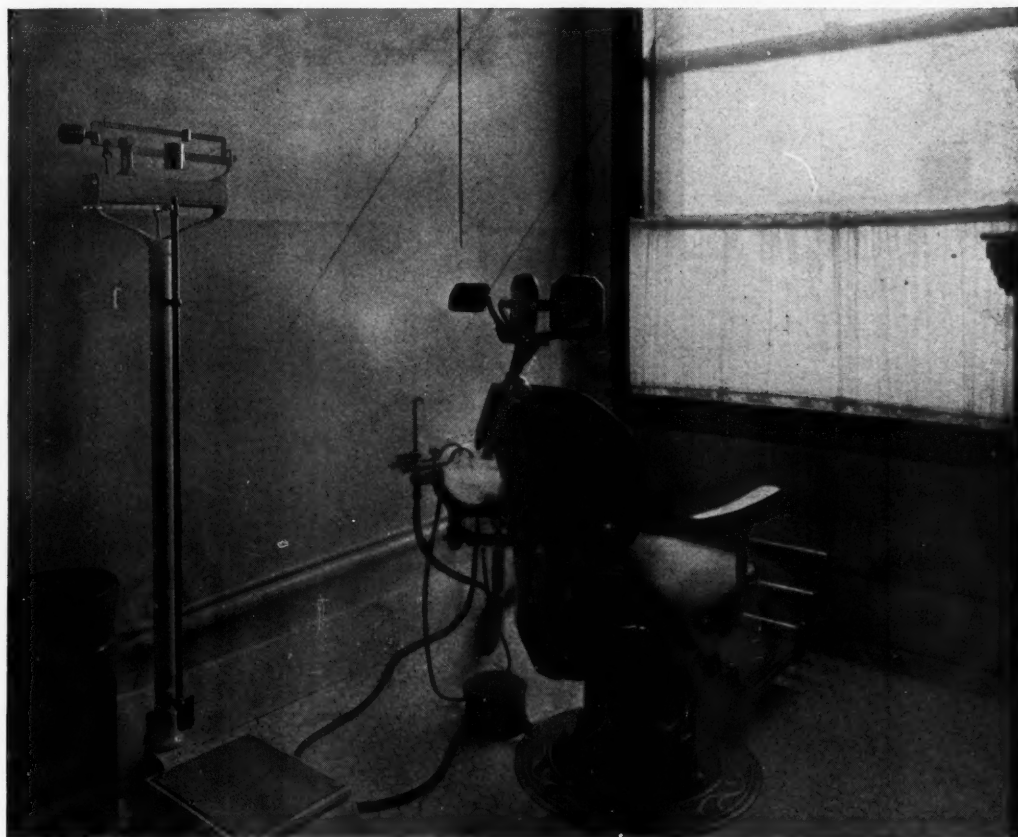


Fig. 8.—Corner of operating room No. 1.

One of the faults of most professional decorators is that they do not leave a place for pictures, when pictures are really so essential to the restful appearance and real usefulness of a room. One lone good picture and no wall decorations is much to be preferred than the best of wall decorations and no picture.

Photographs of illustrious and near-illustrious friends are altogether out of place in a reception room or business lobby. A picture of some universal benefactor, however, is always in taste. If there is room for it, at least one national patriot's picture should be in the office. If there is any local artist of standing it is both considerate and proper to secure one of his works of art for the decoration of the office.

The business lobby (a corner of which is shown in Fig. 4) connects the re-

ception room with the working section of the office suite. It should be both comfortable and have a business like appearance. Necessarily it must be near the center of the office suite. The business lobby in the center of the suite eliminates an objectionable feature so often found—that is, operating rooms opening off the reception room. Such an arrangement could be based upon no better taste than placing a bath room where it would open out of a drawing room. The lobby is the natural place for the assistant's desk. From the reception room all professional equipment should be positively hidden. There is no reason for the flaunting of face masks, plaster molds, instruments, or other



Fig. 9.—View of operating room No. 2.

professional equipment in this or any other room. The use of wall pictures should be continued as in the reception room. This room is not intended as a place in which any of the patients will remain for any length of time—in fact, it is merely a room for joining the several other rooms and thus affording an efficient office system. Comfortable, roomy seating places, such as were in the reception room, are not needed. Plain, strong chairs will suffice—and few of them. As in the reception room there is no table—except that of the assistant.

There is no better place in which to mention the assistant's dress than in this connection. Unless your assistant is a trained nurse and in your practice you require her services as such, do not dress her like a trained nurse. This imitative garb of the trained nurse is in some localities being played equally as

strong as the terms "antiseptic" and "sterilization," where the quality exists in name only. Let the assistant be dressed in accordance with the duties she may be called upon to perform.

The private office (shown in Figs. 5 and 6) is the place where the professional man transacts his private business, files his models, professional data, correspondence, books, professional magazines, and where he writes or dictates his correspondence. A business desk, files for keeping his correspondence



Fig. 10.—Engine cabinet in operating room No. 2 (closed).

and other literature, sectional bookcases for his books, an enclosed cabinet for his molds and masks, and two chairs are the only furniture and equipment needed for this room. One of the chairs should be heavy and of a less easily moved type—for the use of the person who might be called into this private office to discuss some professional matter. The other chair should be light in weight—capable of being moved to suit the convenience of the owner. The necessity of keeping the molds and masks out of sight when not wanted is im-

perative. The closed cabinet on the left in Fig. 5 shows the manner in which the unsightliness of an open model case may be avoided.

The operating rooms (Figs. 8 and 9) should be sanitary, light, roomy, airy, simple in appearance. The operating chair and other professional equipment should be that which is planned and constructed for the use of orthodontists—and not something which has been adapted from some other profession. When

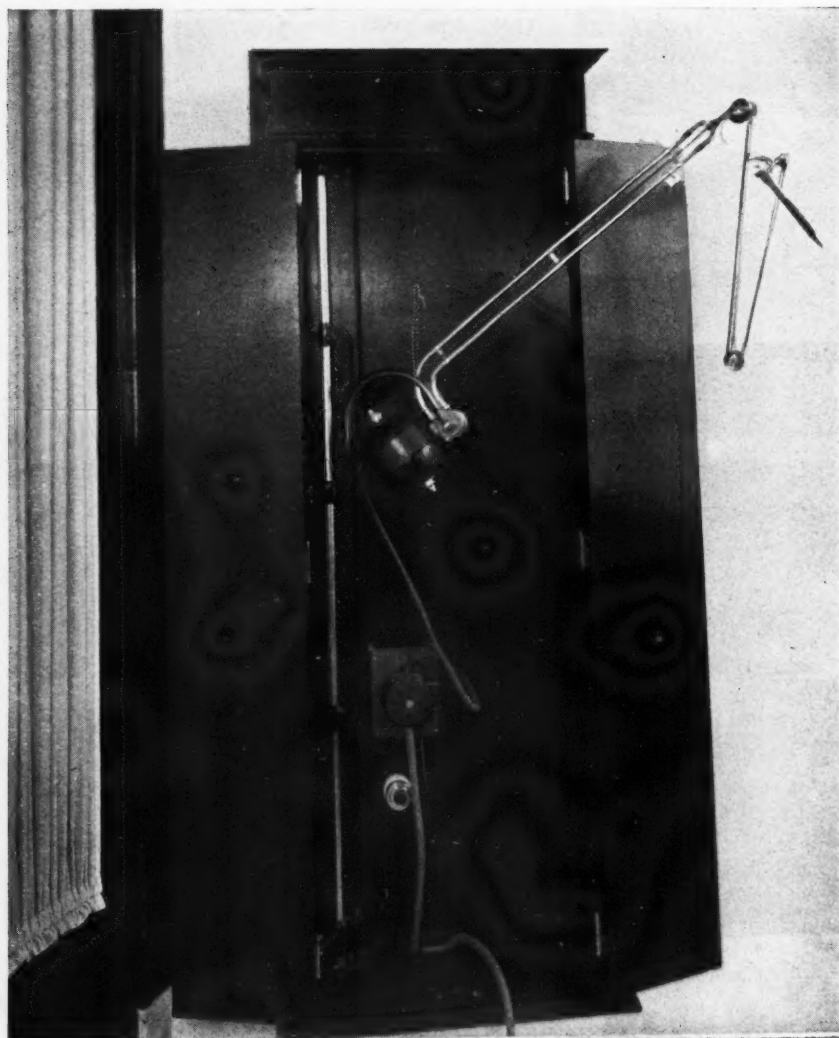


Fig. 11.—Engine cabinet shown in Fig. 10 (open).

possible, every piece of professional equipment should be so arranged that it can be under cover and out of sight when not in actual use. An illustration of such equipment concealment is given in the engine cabinet (Figs. 10 and 11). In one of the two operating rooms should be an ordinary chair, aside from the operating chair, this being for the use of a companion who might accompany the child during the first few visits which the child makes to the office.

The laboratory (Fig. 12) should be close to both the business lobby and the operating rooms. Good lighting and ventilating are important, and caution

should be exercised in leaving no places where refuse might accumulate or which would tempt the owner to fill with anything which is not in actual use. Of all places where order and system is exercised, the laboratory should be the first.

The x-ray equipment may appear noticeably absent to some. Such apparatus has become entirely too common to the public to overwhelm them in your modernizing and progressiveness whether or not it is in evidence. The access that most of us in office buildings have to well equipped x-ray laboratories makes this investment unnecessary. There is no more economy or neces-

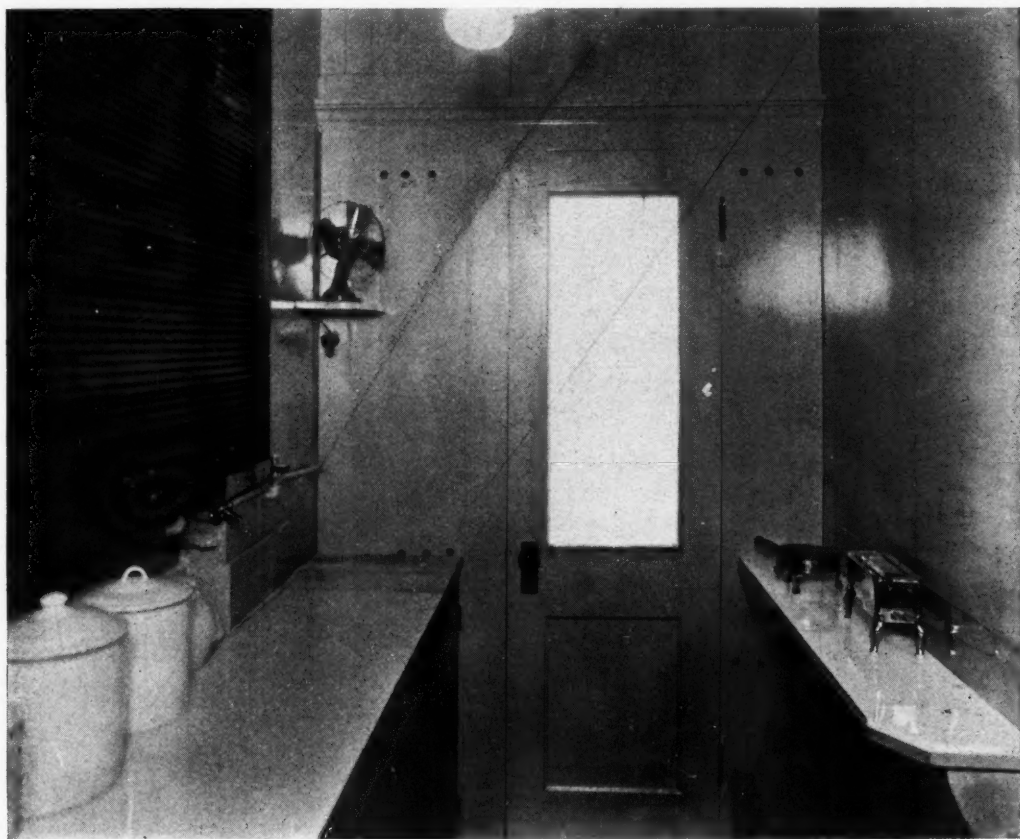


Fig. 12.—View of laboratory showing wall model cabinet, door opening into storage closet, work bench, and porcelain enamel plaster cans.

sity of operating and maintaining an x-ray equipment than there would be in owning a complete photographer's outfit and in doing the work ourselves which we usually send to a photographer.

The retiring room (corner of which is shown in Fig. 13) should open off the business lobby. A hall tree, rack, mirror, roomy umbrella rack, and chair are the only necessary furniture. This is the only place in the entire suite of rooms where wraps may be left. There are no other hooks, and not even a table where clothes might be left lying. As may be seen from the floor plan (Fig. 1), the retiring room is close to the private exit so as to make additional steps unnecessary.

The private exit (Fig. 13) is a necessity. By utilizing this exit patients

who are leaving will not bother those waiting in the reception room. The doctor or assistants will have no reason to go through the reception room.

The value of a well selected and a well executed color scheme for an office cannot be overestimated. Three of the common and possibly the most primitive means of man expressing his thoughts are in language, music and color. Color is one of the most potent and certainly one of the most pleasing means of expressing thought. Also it is the most abused and least understood.

For practical purposes the floor covering is perhaps the first thing to consider in planning a color scheme. This would not be the case if carpets



Fig. 13.—Hall leading to private entrance and patients' exit. One corner of retiring room is shown where hooks are placed at a convenient height for children's use.

or rugs of a certain desired texture and color could be secured readily. The floor is covered for comfort and to make it more beautiful by softening the wood appearance and adding texture. Oriental rugs, being designed primarily as prayer rugs, or rugs to be sat upon, are not particularly suited for real service on a floor. They should be taboo in planning an office. The dominating tone of the floor covering should be the dominating tone in the wall. The floor covering should be modest in color and appearance, eliminating the disposition of a person to "place his feet with conscious calculation."

The psychological meaning of colors is of vital necessity if we would make the most of this important feature of decorating.

According to the scientists the three elemental pigments are yellow, red

and blue. All other color tones may be made from these three colors. Consequently, these three colors are the most easily grasped. Normal green is one-half yellow and one-half blue; orange is one-half yellow and one-half red; purple is one-half blue and one-half red. These latter three colors are the binary colors.

Yellow resembles the sun or some form of artificial light, like light it therefore brings cheer into a room. It is buoyant and cheerful.

Red represents blood or fire—it arouses passions and creates ideas of irritation and warmth.

Blue is non-aggressive. It has a tendency to hold red in check or destroys the too-pronounced effect of red and yellow in a group where the three appear. Blue represents coldness—like the blue sky in winter. It means formality, coolness, repose and restraint.

Green, which is yellow and blue, has the characteristics of these two colors. It is cheerful and cool; it has light and restraint. It renders people comfortable. Scientists claim that it is the most restful color to the eyes.

Orange, which is red and yellow, has the characteristics of both of these colors. It is heat and light; passionate and buoyant. It is practically opposed to green.

Purple, which is blue and red, possesses the characteristics of both of these two colors. It is cool and hot; reposeful and passionate. It practically destroys itself as far as color significance is concerned. Consequently it interprets mysticism, sorrow and dignity.

These six colors represent certain distinct sensations or feelings. These sensations and feelings can be altered or governed by the mixture of the colors and a keen knowledge of the virtues of each color is necessary if the individual is to materialize just exactly the feelings which he wishes in his office suite.

According to the rules of the scientist, one of the three elements—yellow, red or blue—must be introduced in a color scheme in such a way that its influence will be felt.

The Tiffany style of wall finish is perhaps the most satisfactory in materializing one's color ideas in an office suite. This style is also particularly appropriate for an office where some paint is considered more satisfactory than wall paper. While the general rules of color are to be remembered, it should be borne in mind that individuality should be allowed free rein in order to materialize the individual ideas of the person. A proper recognition of the "accidental" is also valuable, as an accidental color, introduced at the proper place, will set off a room in a manner which is impossible with mere solid or mixed colors.

## THE HISTORY OF ORTHODONTIA

(Continued from page 384.)

BY BERNHARD WOLF WEINBERGER, D.D.S., NEW YORK CITY.

**P**H. F. BLANDIN (1836)—"*Anatomie du System Dentaire*" went deeper into the development of the teeth and the influence of dentition upon the face than any of his predecessors. He was probably the first to note the non-eruption of certain teeth and the results therefrom.

"Second dentition is not always accomplished with such exactitude; many circumstances, as I have already indicated, may occur to interrupt it. The permanent teeth sometimes are not formed at the usual time, and those of the temporary set continue to occupy their places. This is a species of irregularity which most frequently occurs, and which may include either the whole series or a lesser number of the teeth."

"All the great molars, when they first make their appearance, are directed obliquely forward, but afterwards take their straight position, when the alveolar arch is more crowded with them."

"The action of the teeth upon the soft parts of the face, reduces itself, in our examination of the subject, to the greater or less tension of these parts, for it does not come within the range of this work to consider the sympathetic affections caused by the development of the teeth. In the fetus the cheeks are placid and make a kind of projection outwards, in consequence of their excess of length, which they hold in reserve to give room to the teeth when they issue from their alveoli. It is this condition of the parts which gives to the face of the new-born infant the disagreeable and almost senile appearance which it presents. The cheeks continue to present this excess of length until commencement of the eruption of the teeth; and if, before this period, the physiognomy loses its disagreeable character, and assumes almost angelic expression so apparent in the face of an infant, and it is in consequence of a deposition of fat in the subcutaneous tissue, and is not the result of any increase of the teeth."

"After the eruption of temporary teeth the cheeks are less full; the face is more elongated vertically than before, and has a much more agreeable expression."

"Up to the time of the completion of the second dentition, the cheeks possess a much greater extent from above downwards before, than posteriorly, which gives them a triangular form. After this period they become more square, in consequence of the depressions of the angle and increase of the rami of the inferior jaw."

"Finally, in old persons, when the teeth are fallen, the cheeks again become placid as in the fetus and the face assumes a much less agreeable expression as the fat disappears; the cheeks no longer having, as in the child, their full rounded appearance."

"The influence exercised by the teeth upon the maxillary bones is very great, and it is necessary to give particular attention to this part of their history."

"The action of the teeth upon the jaws is two-fold; directly, they affect the dental arches; indirectly, the lower border of the inferior maxillary bone, the inferior dental canal, the angle of the jaw, the mental process, the mental foramen, the relations of the condyle and coronoid process, the pterygoid process, the malar tuberosity, and the sub-orbital foramen."

"*Changes Produced by the Teeth upon the Dental Arches.*—These changes are affected in the form and dimensions of the arches."

"The maxillary bones are, really, formed into two distinct portions; that which has an immediate connection with the teeth, and the properly called dental portion. The dental part, to which we will direct our attention at this time, is of less extent than the others. With regard to development, it is always in exact relation to that of the teeth; and, like the teeth, it undergoes a series of modifications in early life, which are very exactly repeated at an advanced age."

"The dental portion of the maxillary bones presents itself in the form of a simple trench, almost imperceptible at the period when the development of the germs of the teeth first becomes sensible. A little while after, it is separated into a certain number of alveoli,

common to the teeth of the first and second dentition. Somewhat later, two distinct sets of alveoli for the temporary presents but a single range of alveoli for these teeth. Finally, after the loss of teeth the alveolar portion of the maxillary bones is obliterated, and gradually takes the form presented in the embryo."

"The alveolar arches undergo a series of remarkable modifications, with regard to their dimensions, in consequence of the development of the teeth. In height, they follow very exactly the development of the roots of the teeth, as may be inferred from what has preceded. They are at their maximum of development, in relation to their volume, about the age of five or six years, at which period they give place to the teeth of the first and second dentitions; before and after this epoch, in inverse proportion, with regard to age, they diminish gradually. Considered in relation to their length, the changes are more complicated, the circumstances of which it is important fully to appreciate."

"The extent, in length of the alveoli, is necessarily in proportion to the number and volume of the teeth, to which they give place. It may be asserted, indeed, without fear of contradiction, that, under this relation, the alveolar arches continue to increase from the beginning of life to the full development of the wisdom teeth; and if they do not decrease from that period in length, it is only because they are maintained by the non-dental portion of the bone, which cannot diminish."

"Another question presents itself here, which is a little more complex and a little more difficult to resolve—it is this: Do the twenty anterior teeth of the second set occupy more or less space than or only the same amount of space as the teeth which they replace? Or, in other words, when the first great molar is developed and takes its place in the dental arch, does that portion of the alveolar border, which is anterior to this tooth, undergo any modifications with regard to length? Hunter first proposed this question, and he decided that the anterior portion of the alveolar border remained unchanged; but his theory, so wisely adopted, has not met with the assent of all; Blake and Leveille have advanced a different opinion. This point of odontology deserves to be examined with much attention, as it has a directly practical bearing in regard to the artificial direction of the eruption of the permanent teeth."

"M. Oudet proved, first, that when the secondary incisors appeared, they, being larger than those which preceded them, caused an elongation of the alveolar process, proportionate to their excess of volume, and that the first large molar is pressed a little backwards; he showed, secondly, that after the eruption of the fourth great molaris, the first is again pressed forwards to its proper place, as there is more room, in consequence of the eruption of the second small molaris, which is much less in volume than that which preceded it."

"Finally, to terminate this subject, let us present a consideration which does not appear to have been yet properly appreciated; nature shows by the manner in which she proceeds in the development of the second teeth, that there is to be no increase of this anterior portion of the alveolar arch, for the canine tooth does not make its appearance until the issue of the first and sometimes the second small molaris, and it is, meanwhile, placed out of the dental arch. If it be admitted, that there is an increase in length of the anterior portion of the alveolar arch, as is believed by Blake, then the cause of this particular arrangement is inexplicable. If the opinion of Hunter be admitted, nothing can be more simple. The secondary incisors, larger than those of the first dentition, having taken the place of the canine, the eruption of this tooth is delayed until sufficient space is gained by the change of the temporary molars for the bicuspid, which are smaller."

"After the loss of the teeth, the alveolar arches diminish in length, from behind forwards, and take again the first form they presented. In the child of five years of age they are semi-circular; they are parabolic in the adult and assume again the semi-circular form in old persons."

*"Changes Produced by the Teeth Upon the Lower Border of the Inferior Maxillary Bone.*—M. Miel first directed the attention of anatomists to this subject. He has shown that the lower border of the inferior maxillary bone is slightly arched upwards, particularly backwards, in the child and old person, but that it is perfectly horizontal in the adult."

*"Changes Produced by the Teeth Upon the Inferior Dental Canal.*—In the earlier stages of the formation of the inferior maxillary bone, this canal does not exist; the vessels and nerves to which it afterwards gives lodgment now occupy the bottom of the groove, which is the rudiment of the canal. This canal is developed, together with the conduit destined to give place to the vessels of the temporary teeth, when the alveoli are separated from each other. In the adult, this canal is placed about the middle of the bone, between the dental and basilar portions. In old persons, after the obliteration of the

alveoli, the dental canal occupies the superior border of the bone, but it never disappears entirely. In early life it corresponds exactly to the lower portion of the alveoli; in the adult it is placed a little within them, pressed towards this point, according to Cuvier, by the prolongation of the roots of the teeth. During uterine life, and until some time after birth, the dental canal of the first dentition is very large; but from this time it diminishes gradually and finally disappears entirely, when the fall of the temporary teeth is accomplished."

Chapin A. Harris (1839), in *"The Dental Art,—A Practical Treatise in Dental Surgery,"* gives particular and detailed description for the treatment of various kinds of irregularities and in this followed the practice of Fox, whose method, he says, has formed the basis of the established practice of the last twenty-five or thirty years, and this long trial has proved that they were founded upon the knowledge of the laws of economy and practical experience.

He describes an infringement of the laws of growth or disturbances of the functional operation of the jaws resulting in a bad arrangement of the teeth. He also mentions supernumerary and irregular individual teeth; attributes irregularity of the teeth to the narrowness of the maxillary arch, and sometimes to the presence of the temporary teeth.

The work of Desirabode and Delabarre, although published in English anonymously, are supposed to have been translated by Harris. The first editions

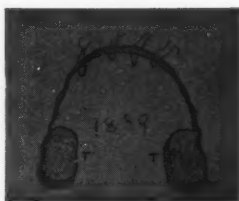


Fig. 1.—Appliance of Chapin A. Harris (1839).

of *"The Principles and Practice of Dental Surgery"* (1842, 1844, 1847) and the American edition of Jos. Fox (1846), were based mainly upon the investigation of Delabarre and Fox. However, in 1839 Harris introduced his novel method of using gold caps on the molars as advocated by Desirabode. He was the first to make use of the knobs soldered to the band for rotating teeth, although Delabarre used the small tubes for the same purpose.

It was not until 1850, in his edition of *"Dental Surgery,"* that Harris used the word "orthodontia," and not in 1836. Lefoulon in his work in 1841, translated by Thos. Bond, in 1844, was perhaps the first to use the word "orthodontosie."

The work of Harris and the various appliances used by him in his writings on orthodontia will be taken up in detail later on in this work.

Until the discovery in 1839 of the process of vulcanizing rubber, most of the appliances consisted of bamboo, wooden wedges, metallic arches, inclined planes, etc. After the discovery of this important material, regulation of the teeth took on a new interest, innumerable appliances being constructed, which in some sections of the country are common even at this date.

B. A. Rodriguez (1839) in his article, *"On Irregularity of the Teeth,"* published in the *American Journal of Dental Science*, was perhaps one of the first

in this country to treat this subject. He regarded the irregularities of the teeth as deformities of habit rather than natural ones; that where the muscles through long use have been changed, the bones would remain in that position.

Rodriguez invented the metallic plates (illustrated in Fig. 3) which, after the patient had worn for one month, fully answered the purpose intended. "The lateral deformity is radically obviated, as the engraving illustrating the original defect and the remedy will show. But here but one-half of the undertaking was accomplished. After restoring the jaw to its natural form, I found that the upper row of teeth still struck on the interior of the lower, and that whenever the patient separated her lips the same ugly lapping of the lower jaw over the upper was visible. The mouth and teeth presented the reverse appearance, uniformly met with, and resembled strongly the sullen grin of the bull dog. To obviate this, I invented the accompanying instrument (Fig. 2) so arranged that when placed on the upper central incisor of the right and secured to the first bicuspid, it operated as a lever in giving an outward direction to the tooth, re-

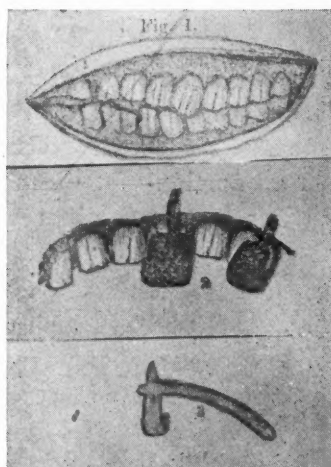


Fig. 2.—Appliance of B. A. Rodriguez (1839).

storing it to its proper and natural position. The constant use of this instrument has so far and fully rectified the second difficulty that she now articulates without restraint; enjoys a free use of the jaw and differs in no particular from the ordinary appearance of other persons. Her parents are satisfied and she herself rejoices that art has been able to triumph so singularly over the freaks of nature."

Fig. 2 is the plate referred to which is made of platina, bent on itself and mounted on two golden caps, and intended to strike on the interior and lateral sides of the incisor and canine tooth of the upper maxillary. By the use of these plates, a forward and lateral motion was given to the jaw, and the deformity thus remedied by its use.

Fig. 3 illustrates a hatchet-shaped instrument, with its longer end curving on itself, forming a loop that enclosed the tooth. At the extremity of the handle are small holes for the insertion of wire, by which means it was lashed to the first bicuspid.

Chas. de Loude (1840) in his "*Surgical, Operative and Mechanical Dentistry*," writes as follows: "Irregularity is due to the supernumerary teeth, to second teeth being too large and the maxillary arch too narrow, to too early extraction and too long persistence of temporary teeth, to the shape of the maxillary arch, and to heredity, where the child inherits the jaw of one parent and the teeth of the other." Here we find the beginning of this inherited tendency; often spoken of and held to be true until Dr. Angle opened the eyes of the dental profession to what orthodontia really was.

De Loude following the system of Bourdet, shows a splendid conception of occlusion, ending with the following words: "Should this work be received by the profession with any degree of encouragement, it is my intention to publish, at some future date a pamphlet, treating exclusively of the irregularity of the teeth and their management." Having been unable to discover such a work the author is led to believe that the profession in England cared little for this phase of the subject. France was far more advanced, for the next year brought us the work of Schange and Lefoulon.

C. B. A. Lomnitz (1840) in "*Die Lehre von Schiefstande der Zähne*," differed considerably from his contemporary, Kneisel. He believed that one should not by any means begin to treat irregularities of the teeth before all the teeth erupt and take their places, and that early treatment in many cases causes the teeth to decay and be lost. He also classified conditions according to the distortions of the teeth and unequal proportion of the arches.—(A) General Distortion; (B) Partial Distortion. His treatment differed from Kneisel, though not as practical or as satisfactory.

Brewster, in the November, 1840, issue of "*Gazette des hospitaux*," was perhaps one of the first to use a rubber plate, which extended from the molar to the anterior teeth, but did not touch those that were to be corrected. Attached to the plate were spiral wires from which ligatures were fastened to the tooth that was to be moved.

In another article, "*La Lancette Francaise*," Paris, Nov. 14, 1840, Brewster reported another method of treating irregularities.

The article dealt with:

1st. "The anomalous developments of the anterior portion of the superior maxillary bone,—the great obliquity and prominence of the incisive teeth of that bone, and the remedy after two months' treatment."

2nd. "The retraction, on the same subject, of the upper lip: the section of the myrtiform muscle, and the cure."

"A gold plate was fitted to the inner circle of the alveolar process upon the palatine vault: this plate supported a set of spiral springs, which were attached to the disarranged organs, and were intended to exercise upon them by their contraction a gradual drawing of the teeth inwards."

"Although this wonderful change had taken place, as respected the teeth, still the retraction of the lips remained, notwithstanding the recent advantages obtained. M. Blandin, who was consulted by Mr. Brewster, was of the opinion that by an incision made into the myrtiform muscle, and a proper compression adapted, the second infirmity might be remedied."

"The muscle of the lips was seized by pincers, and the section made by

curved scissors. Two elliptical incisions were performed on the mucous membrane of each side of the corner of the lip—this being done, the lip was turned up, and the section of the fibers of the myrtiform muscle given by means of an incision made by gliding along the maxillary bone a short distance. After this operation, the edges of the incision made upon the sides of the curvature, were brought together by means of a suture, and thus the lip was drawn down, the exuberant portion of the mucous membrane destroyed, and this organ enabled to regain its proper form. The whole was kept in its proper position by means of an apparatus made for the purpose by Mr. F. Martin."

"No marring accident took place. The tenth day, the threads were withdrawn, the reunion of the parts was complete; but the apparatus was continued on for some time longer."

J. Lefoulon (1841). "*A New Treatise on the Theory and Practice of Dental Surgery*," goes more into detail and records more notable advance in practice than any of his predecessors. It seems this work represents the practice and knowledge of irregularities of the teeth, causes, and treatment so well that somewhat extended extracts from his work should be given. It will be seen that little, as to the causes of malocclusion, has been added since the time of Lefoulon, and his paper alone is worthy of retaining.

He was the first to attempt to give this specialty the name Orthodontia and in his work appears the first mention of this particular branch of *Orthodontosie*. Thomas Bond, in translating this work in English, in 1844, changed the ending "osie" and added "ia," and as Orthodontia it has been known since then, although two years previous, 1839, Diserabode, in *Gazette des hospitaux*, called this branch of dental science, Dental Facial Orthopedia.

In describing the various deformities of the jaws and teeth, Lefoulon follows the idea of Maury.

#### MANAGEMENT OF SECOND DENTITION.

"This subject is, unquestionably, one of the most vexed in dental medicine. With regard to it, opinions, directly opposite, are advanced and defended with equal warmth and equal talent, by men the most distinguished in the art. As for ourselves, long experience, corroborated by the most conclusive facts, observed in a large circle of practice, has led us to form those opinions which we expect to establish by the most satisfactory evidence. But, previously, we must consider some generalities."

"It is, for the most part, children brought up in the large cities in whom the first dentition is affected in a painful and irregular way. Those born, in the country, and the children of the poorer class in town, are favored with a remarkable dentition, not only on account of the facility with which it is performed, and the beauty of the denture, but for the absence of the pain to which others are subject. The reason is plain. The habit of exposure to changes of weather, and of exercise in air, frequently renewed, if not always pure, imparts a remarkable strength to the constitution. But, for the children of the rich, circumstances are very different, at the time when everything should be directed to the development of organs most essential to every part; the result

is, a predisposition to numberless disorders, and an exalted sensibility, which quintuples the intensity of the least suffering."

"We may then affirm, that one means of preventing the accidents of second dentition, is to procure for children, as early as we can, a sound and vigorous constitution."

"But it will not suffice to prevent the disorders which are likely to attend the eruption of the permanent teeth, it is also important to have regard to their symmetrical arrangement. What then are we to do to this end? Are we prematurely to extract the temporary teeth or leave them to the course of nature? And where the negligence of parents has procured for children an irregular denture, must we take away a permanent tooth to facilitate the restoration of the rest to proper order?"

"Let us consider the first of these inquiries, must we extract the temporary teeth? When they fall out with difficulty, when their presence becomes a mechanical impediment to the progress of the permanent teeth, and obliges them to take an irregular direction or growth, we must not hesitate to extract them. Unless we do, we expose the children to deformity, which is much easier prevented than cured."

"Some dentists are afraid that, in attempting to take away the deciduous tooth, they might also extract the germ of the permanent one. This fear is entirely chimerical. Between the fourth and fifth year the germ is destroyed by absorption."

"Nevertheless, it is wrong to remove the milk teeth prematurely, and, without good reason, for if we remove more teeth than can be readily replaced, those of the second dentition, finding more room than belongs to them, may encroach upon the proper space of those that are to come after, and thus induces irregularity more or less deforming. If, on the contrary, we take care not to remove them faster than they can be supplied with exact regard to the space proper to each succeeding tooth, the dentures will be of that symmetrical character which so singularly beautified the mouth."

"There are some dentists, however, who, urged with a desire to operate, make no scruple to extract the first teeth without regard to necessity. What is the consequence? From a child of seven years, for instance, you take away the four incisors; they are replaced. But those which come after them being larger than the first, force the temporary canines to give way before their time. You then remove these canines. Those which are to replace them, finding no longer the resistance which ought to restrain them, shoot up in such a way as to arrange a deformity caused by this meddlesome management, which is but too frequent. Another reason why the temporary teeth should not be unnecessarily extracted is, that their presence contributes no little to the spread of the jaw, or of the alveolar circle which has not yet attained its full dimensions."

"Every day's experience shows us that the teeth, which are at first, to a trifling extent, irregular, will straighten themselves as the circle of the jaw expands. We would urge upon our brethren to take a lesson from nature, who thus re-established the harmony for a moment disturbed."

"As M. Miel has well observed in a treatise, the entire doctrines of which we are far from endorsing, two things may powerfully contribute to irregularity

of the teeth. 1st. A foetus feebly organized may be borne puny and slender; everything being in accordance with this imperfect state, the germs of the teeth are small. When the time of dentition arrives, it is possible that the constitution of the child may have become more vigorous; the pulps and teeth of the second formation will thence be relatively larger than those of the first dentition."

"Again, the child may have been originally well formed, and its milk teeth have received their full development, but disease, scrofula for example, occurs, which gives to the second teeth unnatural size; these will, of course, be out of proportion to the first. In these cases, it is impossible that the dentition should be regularly performed. The teeth press upon one another and necessarily assume irregular positions. When thus situated, they are not only disagreeable to the sight and in each other's way, but being difficult to clean, they decay with great rapidity."

"Pressed with the serious nature of these consequences, dentists have not failed to suggest and to try means, more or less rational, as they were or were not in accordance with nature. Some viewing the anterior of the arch of the alveolar border, which contains the twenty temporary teeth, as being entirely immovable, stationary and fixed, in the midst of the general growth, can think of no expedient but the extraction of one or two molars, in order to give the other teeth more room to arrange themselves. Others, among whom we confess ourselves to be, affirming that the alveolar arch, like all other parts of our bodies, is capable of extension, oppose strenuously, such a mutilation as the sacrifice of permanent teeth for the better arrangement of the denture."

"Before announcing our views upon this subject, we think proper to prove one thing, in contradiction of M. Miel, that is, that the anterior part of the maxillary is susceptible of development, and that when nature fails to effect it, we may succeed. Here we are compelled to anticipate some things which concern dental pathology in general. For a long time, it has been our habit, when consulted by patients troubled with prominence of the dental arch, growing out of a too near approach of its lateral extremities, to overcome this deformity to apply eccentric force upon the molars of each jaw. But under these circumstances we do not use as complicated an apparatus as when we have to do with extreme narrowness of the jaws. Again, if we observe nothing but too close an arrangement of the teeth, which forces them from their symmetrical relation, we are contented when the subject is a child to introduce the thumbs upon the upper jaw, and by frequent and well managed traction, to force the alveolar arches apart. We perform this operation before the parents and prevail on them, or on the child itself, to repeat it every morning and even during the day."

"Treatment of Congenital and Accidental Deformities of the Mouth—*Orthodontosie*."

"This branch of dentistry was long in its infancy. The greater part of dentists, ignorant of the facility with which we can impress upon the teeth the direction we wish them to take, imagined that so many difficulties were to be overcome, that they could expect no aid except from artificial luxation. And, as few patients were disposed to submit to this cruel process, it has happened

that this ridiculous plan, having, perhaps, never been submitted to experience, has continued obstinately to hold a place in the annals of science."

"May we, an experimental practitioner, be permitted to deplore the little knowledge, we will even say the little conscience, with which the greater part of the dentists attached to boarding schools, for the purpose of directing, as they call it, the second dentition, perform their work. Our thorough conviction is, that instead of aiding the accomplishment of the dental evolution, they only interrupt it by their violent maneuvers, which deprive nature of the points d'appui which she has given herself to combine the arrangement of the precious organs of which we treat. Hence, the beginning of all these imperfect and distorted dentures, where the teeth vault one upon another in the most deformed manner. One thing of which they seem to be careless, and utterly without thought is, that the expression of the face, as to grace and dignity depends mainly upon the mode in which second dentition is effected. When through the evils of ignorance they have adorned the jaws with overlapping teeth, the palatine vault, a true elastic cupola which enlarges or contracts with the enlargement or contraction of the denture contracts upon itself, and thence, my word for it, arise those elongated jaws, and sharp visages, which are so grotesque and unpleasant. Nor is this the greatest mischief. If the person afflicted with this artificial contraction of the palatine arch, be destined, by his superior faculties, to speak in public, his voice is indistinct, and his pronunciation difficult and embarrassed. So that with the most beautiful thoughts, with sentiments the most noble expressed in the most brilliant language, he is cursed with a stubborn and intractable organ which will only imperfectly convey the passionate emotions which he struggles in vain to communicate to his audience."

"See what consequences, to result from one miserable tooth, which an inconsiderate man has prematurely extracted. See the prospect of the whole life blasted. If the victim be a young girl, her face has no longer the beauty and grace which might have governed all hearts and assured her a brilliant position in life. If a young man, his countenance will not display that dignity, which, if he be called to high employment has so powerful influence upon the multitudes; and his voice, as we have just said, will not correspond to his sentiments; it will not give to his words that sweetness and harmony, which adds so much to the value of thought, and impress the mind so powerfully."

"What we say is not idle declamation, but we speak of facts, of which we will furnish the proofs in the course of this chapter."

"To convince young men, who are called to cultivate the dental art, of the truth of our words, it may be useless to tell them what has happened to us in an establishment of the kind already mentioned, of which we took charge. Being solicited by a friend of ours, who is at the head of this house, we readily consented, but upon condition that we should rarely extract a tooth; in other words that we should be permitted to manage things according to our own notions. I contented myself then, with directing them to make traction upon the jaws with the fingers, etc., and I have already advised, in speaking of second dentition. The result was, that without having recourse to the violent extraction of temporary teeth, I had the satisfaction to see that no denture was irregu-

lar, and that there was none of the overlapping, so common in the subjects of these establishments."

"As, unhappily, but little pains are taken to prevent the evil, we will direct our attention to the means of remedy when it exists."

"For a long time the necessity of restoring the teeth in order has been left, but it must be told, that up to the present time, this branch of art has been so imperfect that even in our days we find dentists of the best reputations sacrificing one or more teeth to remedy the irregularity of others. We think that this is paying too dearly for relief from a deformity, very great to be sure, but by no means comparable to the loss of an important organ, a loss which nature herself can not longer repair."

"The dentist then should correct these aberrations of nature, either by hindering their escape from the rules of arrangement prescribed by nature, while they are taking their position, or by forcing them into their proper place when their eruption is entirely completed, and the teeth present deformities, resulting from vice of conformation or want of care."

"We will not repeat the detailed description of the dental arches, which we have already given in the commencement of this book. We will only say that the direction of the teeth is vertical, and that this arrangement is peculiar to the human species. Moreover, the superior teeth should pass before the lower teeth which they cover, and the lower, at least the anterior ones, should incline from before backward. As to the great molars, they fall immediately upon one another. If we look at the length of the teeth in general, they ought to be nearly equal, as should be the triangular spaces that separate them."

"But in the cities, where the population is heaped together in narrow and unhealthy streets, in Paris particularly, nature, faithless to her laws gives way to all sorts of aberrations. Hence the variations, always disagreeable, and often inconvenient, and, sometimes, monstrous, that the practitioner has called natural disposition of the dental apparatus, before passing to the study of its deformities; for we cannot know how to apply a rational treatment to them, unless the normal conditions be well understood by the operator."

"The principal deformities reduce themselves to the following:

"1st. The teeth often present obliquities, which may be anterior, posterior, or lateral."

"2nd. Sometimes, some teeth undergo a displacement according to their axis, and present a true rotation."

"The dental arches may present three principal modes of vicious relation.

"1st. The prominence, in which the anterior teeth of one or both arches are very oblique, and salient forward. Under these circumstances, the teeth appear very long, and sometimes, the alveolar arches appear to have followed the direction of the teeth."

"2nd. Retrocession, is an opposite deformity to the preceding. Indeed, the subject of it, we remark that the anterior teeth are inclined obliquely backwards. This deformity impedes pronunciation."

"3rd. The inversion of the dental arches, when the inferior jaw passes before the upper."

"In many cases, the teeth, while planting themselves regularly upon the

alveolar border, nevertheless contract anomalies of direction, which must not be confounded with prominence and retrocession. These are the abnormal directions, which are called obliquities, and which are more frequently in the incisors and canines than the others. Sometimes they affect only one or two teeth, sometimes all the anterior ones of one or the other jaw, and constitute repulsive deformities as the following:

"1st. The anterior obliquity which may exist in the two dental arches. Where this deformity exists in the lower jaw, the upper arch instead of overlapping, is itself overlapped, and the two arches, bear an inverted relation to one another. This latter deformity constitutes one variety of the 'galoche' chin."

"2nd. The posterior obliquity also may exist in both jaws. When it attaches exclusively to the upper, it occasions a deformity similar to that just described, the upper range of teeth being overlapped by the under. Another form of the 'galoche' chin."

"Obliquities differ from prominence and retrocession, in this, that in the former the teeth are regularly planted upon the alveolar border, while in the latter the order is more or less imperfect; some being placed too far forward, others backward. When only the two canines of the upper arch project, and the range presents the form so characteristic of carnivorous animals, engrenement (to explain the nature of this deformity, it may be necessary to say, that the word 'engrenement,' indicates the mode in which one wheel is made to turn another by interlocking of the teeth of the one into the spaces between the teeth of the other. Trans.) is a consequence of a combination of all the preceding deformities and exists generally with projects, retrocessions and obliquities. It is one of the most obstinate of all the obstacles which we have to overcome and by many dentists is regarded as incurable."

"Such are the principal deformities observed in the dental apparatus; but we repeat that we are far from having named them all."

"The temporary teeth rarely present vicious directions or deviations. Among the permanent teeth, the anterior are, beyond all comparison more subject to these deformities than the posterior. The reason of this is so evident that we need not specify it."

"Among the causes of dental irregularities, we may regard as the most frequent, the neglect of proper supervision of the second dentition. Very often the temporary teeth are too precipitately removed, and often again the opposite error is committed of suffering them to remain even after the permanent teeth have partly appeared."

"There results from this, an error of relation between the development of the palatine arch, and the superior alveolar border, or of the two arches at once relatively, to the size of the teeth."

"Another cause is the bad habit of permitting children to suck their thumb, and to be continually putting their hands into their mouths."

"Another, is the frequently repeated action of the tongue in the pronunciation of certain syllables called lingual, in which that organ, striking against the anterior superior teeth seems to push them forward. This cause gives rise to the anterior obliquity of the upper arch. We may remark that this deformity

is very frequent with the English, resulting from the pronunciation of lingual syllables."

"Shall we remark upon traumatic causes? We must confess that they are rare, but it is easy to perceive, that under certain circumstances, they may determine the luxation and deviation, at the same time, of one or more teeth, and that the restoration to firmness, being accomplished by unaided natural efforts, may result in various deviations."

"But enough has been said about the causes of deformities. The mechanism of their formation is of at least equal importance to the causes themselves. We may readily perceive that when, at the moment of the shedding of the first teeth, a permanent one arriving, finds a space too narrow to contain it, it must press upon the two teeth, which bind it on either side, and if these latter hold their places in the jaw, the edges of the new teeth, gliding upon them as upon inclined planes, must cause them to yield either anteriorly or posteriorly, as the new teeth pierced the gum upon the side of the lips, or upon that of the buccal cavity."

"Let us pass now to the most important part of our subject; the therapeutics of dental deformity."

"But before describing the methods of cure which we daily practice with constant success, let us rapidly review what our predecessors have accomplished."

"Of course the means used to the present time have varied with the nature of the deformity. We will, therefore, rapidly review what has been proposed for each of them."

"Many means have been advised to separate the teeth when too closely approximated. The principal are, the employment of a piece of wood, interposed between them, which, being swollen by the absorption of the fluids of the mouth, will thus press the teeth apart; the employment of the file, and the extraction of some teeth."

"For the simple rotations or deviations of teeth upon their own axis, some have also advised the file, when the deformity depends on want of room. Ligatures, plates and forceps have also been used."

"M. Oudet has advised to luxate them and then to turn them with the forceps while supporting them with the fingers, and confine them in the desired position by a silken ligature."

"We cannot contend too strongly against this artificial luxation. When but one tooth is affected with this deformity, this means is barely practicable, but when all the upper anterior range, and sometimes, the inferior, too, present obliquities forward and backward which caused them to serrate with one another like the sutures of the cranial bones, we would defy any man to maintain and confirm in position all the upper incisors after he had luxated them. The operation is very cruel, and its success exceedingly problematical. In theory it is all very well to fix them with silken ligatures precisely where the operator shall please; but in practice we very much doubt if it would be so easy. The patient is irresistibly inclined to press the point of his tongue against organs uneasy and loose in their sockets, and these touches, often repeated, will be enough to prevent the success of the operation. But there is another difficulty yet more insuperable, for it will not do merely to restore the teeth to position, it is necessary, also, to give them the room they need, and luxation cannot do this."

"It has never entered into the thoughts of other dentists to overcome this difficulty, but we have completely solved the problems for ourselves and that, too, without having recourse to the file, which, indeed, is not to remove deformity, but substitute it by another; for, certainly, teeth once filed never possess the elegant and graceful appearance of those which have never been subjected to this process. In the course of this chapter, we will furnish the proof of what we have said."

"To return to the different deviations. Solitary ones; that is those which affect only one or two teeth, have been combated by metallic threads, wedges of wood, and the inclined plane. The last means has also been employed to remedy the reciprocal interlocking of the two arches."

"For anterior obliquities, or deviations forward, we have been advised to extract the bicuspid neighboring to the canine, and to use metallic thread fixed to an artificial palate. When this obliquity occurs in the lower arch, recourse has ordinarily been to the inclined plane mentioned by Hunter."

"For posterior obliquities, or deviations, backward, which are regarded as incurable by certain practitioners, operators have generally used the file, a dental gag or inclined plane. We will not mention artificial luxation, except to refer to what we have already said. We regard it as one of the vain theories constructed in the closet, which even the author never hoped to submit to the touchstone of experience."

"For lateral obliquities, some have advised the application of a ligature, which, being fixed to a neighboring tooth, may gradually draw the erratic one towards it."

"For that total deviation, which rather belongs to aberrations than to irregularities of dentition, the extraction of the tooth is often indispensable, especially when, by its situation it impedes pronunciation, or creates inflammatory conditions, followed by abscess, after having given origin to a tumor, whose nature is not perceived until the pus is discharged, and the tooth exposed. These aberrations are of various kinds, each calling for different management, as may readily be perceived, if we reflect for a moment. They not only result at times from the vicious direction of a tooth in the interior of the alveolus which results in a deviation of the dental follicle, but also from the displacement of the latter, since, as we have already said, teeth have been found implanted upon the palatine arch, the internal surface of the cheeks, the tongue, the pharynx, in the stomach and in the orbit."

"The numerous means we have recounted are far from being sufficient to remedy all the deformities we may meet with, of which we have named the most important, and this fact is so well known to those who have devoted themselves to this matter, that in the books of greatest reputation, the authors frankly acknowledged the incompetence of these means to relieve many of the deformities in question and, especially, the vaulting of one on another, which occasions a deformity, until the present time considered incurable. The case is worse, when the cure being pronounced possible, the treatment begins with the extraction of the two first bicuspids. This operation is the sine qua non condition of every attempt at a cure, and the evulsion of one or more teeth has been advised, at least as an adjunct means, for the remedy of almost every kind of deformity."

"We have long thought that this was to begin in a manner by no means at-

tractive to persons who are to be the subjects of the treatment, and in order to avoid this painful operation, submitted to the more regret, as the teeth, whose extraction is indicated by the nature of the deformity, are generally sound, we have earnestly sought a means, which, avoiding the pain of operation, might yet fulfill the object proposed to be attained by it."

"No instruments or methods hitherto employed being found to answer, our researches had a double purpose, viz., to remedy the deformities of the teeth without extraction, except in some rare and entirely irregular cases; and, secondly, to simplify the series of means to be employed hereafter to combat the deformities of the teeth."

"One consideration has conducted and powerfully aided us in our researches. We have remarked, indeed, that in the immense majority of cases of anterior, posterior and lateral obliquity, the summit of the root was always displaced, or in other words, that these deformities resulted from a vicious direction or disposition of the dental follicle, which produced a tooth situated out of the para-

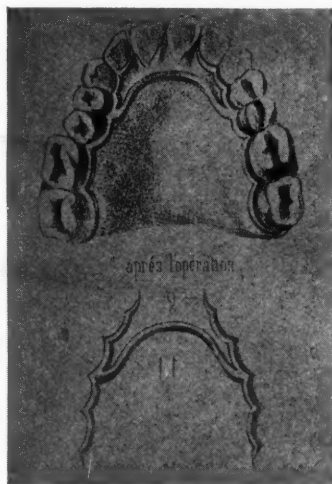


Fig. 3.—J. Lefoulon, 1841.

bolic line constituted by the dental arch, as appeared to be the case in some instances of prominence and retrocession."

"Thence, it was easy for us to comprehend, that in order to remedy these obliquities it was indispensable that some force, yet to be determined on, acting sometimes concentrically, sometimes eccentrically upon the arch, should be brought to bear upon the crowns of the affected teeth as near as possible to the free border."

"The preceding considerations furnished us with an idea of the proper strings, the application of which has completely confirmed our expectations; and, better still, experience soon taught us to extend their application, and we rapidly acquired the assurance that they constituted a means of treatment for all kinds of dental deformity; whether with or without the peculiar inequality hitherto regarded as incurable; and, besides, that by their employment we might remedy the narrowness of the palatine arch, a discovery which we confess surprised us very much."

"It is now, therefore, a fact in science that the vault of the palate, and, much

less, the dental arches, are not unchangeably fixed in their dimensions, as has long been believed by certain dentists, wiser in theory than in practice. This idea, or rather this serious error, so deeply imbedded in all minds, was one of the greatest obstacles to the progress of orthopedic dentistry. Practitioners, firmly convinced that they had to act upon an inextensible circle, found no better means to restore the symmetry of the teeth than to extract one or more of them, or to gain space for one by filing all, which did not contribute a little to narrow yet more the alveolar arch, and to destroy the relation of dimension between the upper and lower jaw."

"The two cases of most common occurrence, are the following: simple inclination, forward or backward, without rotation of the teeth upon the axis or the latter complication."

"In the former case we need only one golden spring, to which we shall give the name passive."

"It is fashioned like a horseshoe, and in such a way, that upon the side it is adapted exactly to the "anfractuosités" of the teeth, and in front, or in the

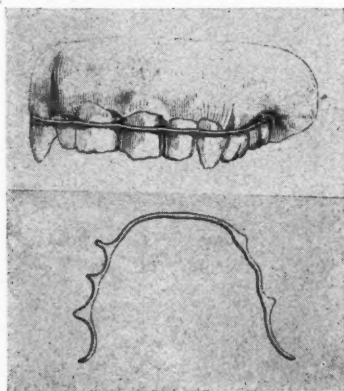


Fig. 4.—J. Lefoulon, 1841.

center, there is a certain space preserved between it and the teeth we desire to redress."

"We are careful to give it a little more play than the space it is to occupy, and as the metal of which it is composed has elastic properties, it acts incessantly and eccentrically upon the crown of the great and small molars. Its extension is singularly favored by the function of mastication. Now, upon each tooth that we wish to redress, we pass a thread which acts as the active spring, having its 'point d'appui' upon the central part of the passive spring. This is acting upon the supposition that the teeth are inclined outwardly. If the case be different, which generally only occurs in a single tooth, we must place the active spring in front, and the thread will take the place of the passive spring. The two agencies being united, the elasticity of the gold semicircle on the one hand, and the traction of the silk thread on the other, we have a power so great, that if we did not occasionally dispense with it, we might fall into the opposite extreme to the evil we wished to correct. What we say is the fruit of experience."

"In such cases when we not only desire to restore the incisors to position, but to redress some of them which are twisted, we employ a second spring which

consists of a little gold plate, larger or smaller, as we may wish to act on one or more teeth at a time. By the aid of two silk threads, we bind its two extremities upon the great passive spring, so calculating the pressure, that the center of the plate may act only on the border of the teeth we wish to bring into line. Now, we may perceive that in this lever we have a power easily controlled, but constant and irresistible, which cannot fail to reduce the organ to its normal state. In truth, this means has never failed us."

"One of the greatest merits of this method, which is altogether new, is that it gives no pain or discomfort, and, moreover, being constant, it more promptly relieves the deformity than when the instrument employed is only temporarily applied, and exerts only an intermittent action."

THERAPEUTICS,—STRAIGHTENING THE TEETH.

"In our ninth chapter we have considered in detail the manner of remedying general irregularities of the teeth by the aid of extensor and counter-extensor springs of our invention. This means, as we think we have proved, is excellent when we wish to procure an enlargement of the alveolar arch, in order to restore a tooth to its place beside the others when it has been excluded by arrest of development in the arch."

"But it would be irrational to apply this mode of treatment to all cases. It is evident that where only one tooth is turned forward or backward, and that, too, without its neck being out of line, there exists more simple means, already in use by our predecessors, which are abundantly sufficient to correct the evil."

"When the teeth have taken a bad direction, nothing is easier than to act upon them by a slight but continued effort. This is so true, that persons who have one or more teeth filed on account of caries, sometimes produce a partial dislocation of them by the habit of pressing the tongue against the parts in their involuntary efforts to explore the unaccustomed void which is there met with. This fact, attested by experience, has given rise to an erroneous notion, that filing teeth causes these deformities. It can only do so indirectly, in the manner described."

"Of all the means in use to procure the restoration of irregular teeth to their proper position, the simplest is a silken thread passed around the tooth very near the gum; the tooth is soon loosened, and then readily yields to the force which draws towards the proper place."

"We will observe, that, in this operation we have not to overcome a mere *vim inertiae*, but an active force, the direction of which must be constantly modified, which is a very different matter. The following is the explanation of the manner in which a thread is generally sufficient to restore a tooth very much displaced forward or backward."

"In order to accomplish this happy result, we fix the thread upon the teeth adjoining that we wish to replace, and make it pass around the latter; and the moisture swells the thread, which shortens, and draws the tooth in the line resulting from the antagonistic action of the two forces which act upon it. After changing or readjusting the thread every two or three days we will re-establish the tooth in the proper position with its neighbors."

"In cases where a tooth is rotated upon its axis, we advise the use of the means we have already described in the eighth chapter; that is to say, the greater

extensor spring, which affords a point d'appui more solid than the neighboring teeth, and the little arched plate of gold, upon the edge of the teeth which projects outwardly."

"When one or more teeth of the lower jaw are inclined backward, the dental art possesses a means of the utmost energy to force a restoration. It consists of an inclined plane, upon which we force the oblique tooth to bear, by its cutting extremity, in such a way that every movement, masticatory or otherwise, leads it to resume its normal position. The first dentists who used it, contented themselves with a sort of metallic trough in which they enclosed the whole range of inferior teeth, but the alimentary matters which were arrested in this apparatus, produced the serious consequence of producing caries in the teeth submitted to their action, or at least to impart to the breath of the patient a disagreeable odor. M. Delabarre proposed to modify the inclined plane by reducing it to two metallic pieces, a millimeter in thickness, fitted exactly to all the anfractuosités of the dentine, reunited by a narrow bridle at their two extremities, with a piece of gold plate, folded at an obtuse angle, soldered to the anterior piece, one or two millimeters from the upper edge, according to circumstances. It is understood that this oblong plate should be soldered in such a manner as to be in relation to the tooth upon which we propose to act."

"We do not know whether M. Delabarre has had occasion to apply the plan thus modified, but we have tried it very much to the benefit of our patients. It preserves all the advantages of the first means, without its inconvenience. The teeth on which it is applied are perfectly relieved from a harmful envelope, and debris of food imparts no fœtor to the breath; for it suffices to rinse the mouth in order to relieve it of all the deposits in the dental interstices."

"Almost all the writers who have treated on this subject have spoken of artificial luxation. This is a means which we have already condemned, and which we cannot too frequently disapprove. The ancients, and some of the moderns who yet imitate them, employed the 'pelican' for this purpose; a violent maneuver, which exposed them to the risk of breaking the tooth at the neck, and thus to replace a deformity by a mutilation a hundred times worse. Besides, it is a cruel operation that should be rejected the instant that mild means can be employed which, at least are equally efficacious."

William Lintott, in "*Structures of the Teeth*" (1841) condemns the extraction or loss of the deciduous teeth, for the permanent ones are sure to be irregular, and the arches underdeveloped. However he favors the extraction of certain teeth in the treatment. He also advocated the use of models and was one of the first to make use of the screw. His work appeared a year previous to Schangé's.

"The contour of the features depends essentially on the form of the jaws. A lofty forehead, expressive eyes, and a well-shaped nose, are most effective adjuncts; yet the character of the countenance, as a whole, will be especially influenced by the position of the lower, and due expansion of the upper jaw. When it is understood how far this desirable conformation depends on the arrangement of the teeth, a due importance will be at once attached to their progress, and the proper degree of watchfulness extended to them, particularly as regards the fairer portion of creation."

"Deformity of the jaws may in almost every case be traced to an improper interruption of nature in *prematurely extracting the deciduous teeth*."

"The first permanent teeth that appear, be it remembered, are the anterior molars, which make their eruption from the gums, close behind the posterior temporary molars. In order to afford a base for these teeth to rest on, the jaw must have elongated backwards. At a later period, the posterior, or second permanent molars, present themselves; and later still, the third molars, or *dentes sapientiæ*. All these teeth being situated still farther back than the anterior molars, the jaws must have elongated in proportion to the additional space required. Thus it is that the maxillary bone, having been originally semicircular, becomes elliptical."

"When the upper front teeth of the *temporary* set take a direction inwards towards the palate, and by their contact force the antagonizing teeth of the lower jaw outwards, the ultimate result as regards the child, if the irregularity be not corrected, will be the protrusion of the lower jaw which is indicated as '*under-hung*.' Soon after the posterior temporary molars have attained their full height above the gum, or about the fourth or fifth year, an accurate model of both upper and lower jaw must be obtained, from which a casing or capping for the teeth of the lower jaw is to be stamped out of a thin plate of either gold or silver. The capping is to be continued from the first or second molar of one side, round to the corresponding tooth of the other; it must fit closely over the grinding surface of the molars, where it must be rendered thick enough to prevent, by its interposition, the contact of the front teeth; the plate must overlap and fit closely also to the outer side of the molars, and be carried entirely down the inner side, and partly onto the gum; over the canines and incisors, it must extend rather more than two-thirds down, inside and out; opposite the space between the necks of the molars, the plate is to be perforated, so as to permit the passage of one or more ligatures, which, tied around the necks of the teeth, secure the capping firmly in its place. On the ridge of the capping is soldered a thin plate of the metal, edgewise, which must be smoothed off gradually. The whole apparatus being thus prepared, it only remains to so adjust the opposing edges of the capping and the upper teeth, that when properly fixed, the edge of the capping shall, on closing the teeth, just slide inside of each of the six upper front teeth. In this way the pressure exercised by the patient at each closing of the mouth, may be controlled and brought to bear upon such of the upper front teeth as need it, precisely in the required direction; and as the degree of resistance opposed by these will be far less than that of the lower teeth assisted by the molars, it follows that they must gradually give way and be forced outwards."

"The presence of the capping will be productive of a slight irritation of the gums, which will facilitate the movement of the teeth. The patient probably will not be able to wear it continuously, but must endeavor to do so. As soon as the edges of the upper teeth have been brought a little beyond those of the lower, the capping may be dispensed with, for the natural action of the jaws will then be sufficient to perfect the desired change of position of the teeth. A proper expansion of the yielding structure of the upper jaw will follow; the permanent teeth, as they erupt, will assume the same expanded arch, the jaw will solidify with advancing growth, and the threatened deformity will be entirely avoided."

"When the anterior *permanent* teeth of the upper jaw have been allowed to assume this irregular position, they may be moved outwards in the same manner, the capping being fixed to the bicuspid, and, if necessary, to the first permanent molar also; but a more eligible mode of controlling their position is the employment of a light bar of gold or silver, passing round their front surface, by means of which they may be either drawn outwards, or driven inwards, as the nature of the irregularity may demand. The mode of preparing the bar, adjusting and securing it with sufficient firmness, is the same as for the capping already described, excepting that it requires to be fitted to the upper teeth only."

"The capping over the bicuspid, by which the closing of the teeth is to be prevented, and the apparatus fastened, is to be carried well down the external surface, and to this part of the capping the bar is to be soldered, extending from the first bicuspid on one side, round to the same tooth on the other. The inner face of the bar is to be modeled so as to fit closely and evenly to as many of the six front teeth as already stand so far forward as to come up to or beyond the desired position. If none of the teeth are thus far advanced, the bar must be made to describe exactly the line of the arch in which they ought to stand."

"Precisely opposite to the center of each tooth which is to be brought out, a strong piece of similar metal must be soldered into the upper edge of the bar: from these points, ligatures of a material known as '*Indian twist*,' are to be passed round the necks of the irregular teeth, and drawn daily closer and closer, until the teeth, yielding to the 'constant pressure thus brought to bear on them, approach the bar, and assume their proper position."

"When any one or more teeth project beyond the right line, and it is desired to move them *inwards*, a small hole must be drilled through the bar, over against the most prominent point of each; a screw-thread is then to be cut, and a short screw introduced, which, working through the bar, will, by a turn or two each day, keep up such a continued pressure against each tooth as will quickly force it back as desired."

"The projection of the screw-heads must not be so great as to cause annoyance to the lip, and longer screws must be kept ready for use, in order to reach the teeth as they recede from the bar."

"In this manner any required movement of the teeth, inwards or outwards, may be effected with great ease, and in a very little time, causing no serious annoyance to the patient, the whole apparatus being removed and cleaned every two or three days. By shifting the point of attachment of the ligature, or the direction of the screw, the force may be brought to bear in a lateral course, if requisite. Care must be taken that the application of the force thus acquired is so distributed that the resisting power of those teeth to which the bar is fixed shall be much greater than that of the teeth under treatment; and if necessary to secure this, one or two irregular teeth only should be acted on at the same time."

"I have stated the age of fourteen or fifteen to be the period at which I would recommend the use of mechanical means to control the arrangement of the teeth, excepting in case of evident malformation, or wherein injury is resulting to the teeth from improper contact, when assistance should be secured sooner. In all ordinary cases, the alteration may be almost as easily effected at the age of twenty as at fourteen. At this advanced period, the jaws will have

attained their full growth, and it will be evident, if irregularity still continue, that Nature requires, in this instance at least, the assistance of art."

*Solyman Brown*, in 1841, prepared his "*Essay on Regulating the Teeth*" at the direction of the American Society of Dental Surgeons, which was intended to be given to the parents in order to prevent irregularities of the teeth in the permanent set.

"If a beautiful and regular arrangement of the teeth, contributes in no small degree to the pleasing expression of the human countenance, so, with equal cer-

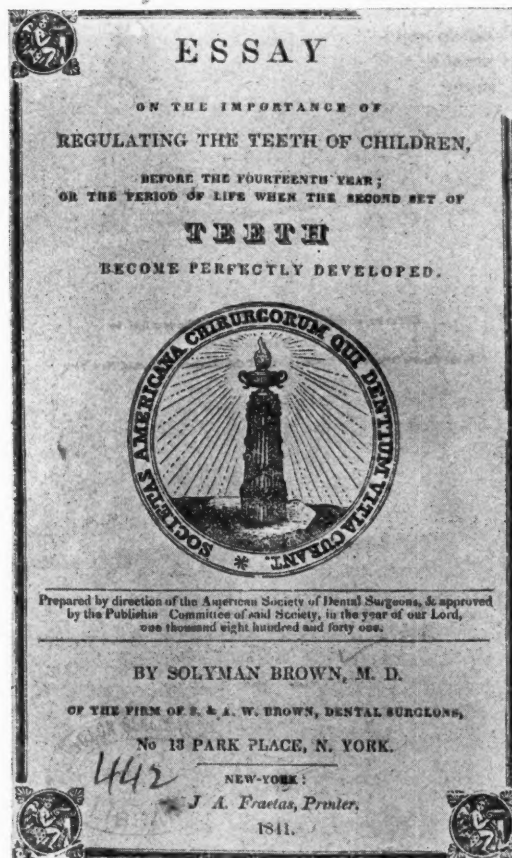


Fig. 5.—Title page "*Essay on Regulating the Teeth.*"

tainty does their malarrangement obliterate no inconsiderable portion of the attractive charms of the finest features."

"Can mothers then be so indifferent to the happiness of their children as to give this subject but a passing thought? Will fathers who spend their lives in the effort to amass fortunes for their offspring, do absolutely nothing to give value to the patrimony which they bestow?"

"Let parents then see to it that the second set of teeth more particularly, are not allowed to take false positions in the mouth. If any protruding tooth is discovered to make its appearance either within or without the dental arch, the judgment and skill of an experienced dentist should be put in instant requisition; because

"First: No other known species of animal is found to be as subject to derangement and irregularity of the teeth, as the human race."

"Second: No other part of the physical system of man is as liable to constitutional and accidental malarrangement as the organs of mastication."

"Third: This malarrangement of the teeth of the human animal, by which the race of man is distinguished from every other species of organized beings, is the result of mismanagement or of evil hereditary tendencies, most of the effects of which may be easily remedied, or altogether countervailed."

"Fourth: The measures to be pursued in order to apply the best available remedy to this evil, must be taken at the proper time or they become inoperative."

"Fifth: No other known species of animal, is found from history, observa-

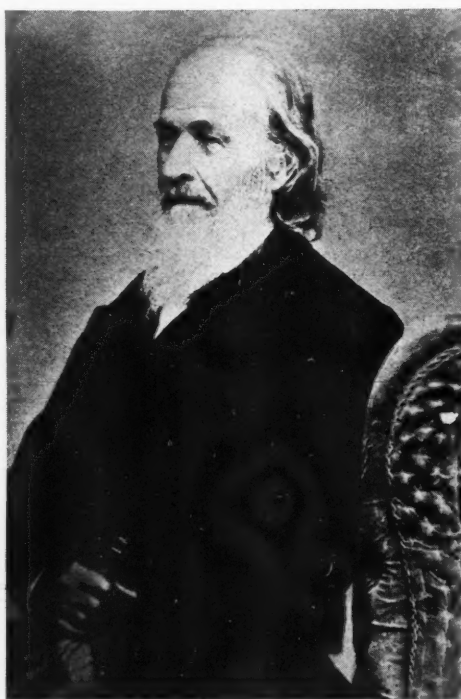


Fig. 6.—Solyman Brown, 1841.

tion and experience, to be as subject to derangement of the dental organs as man."

"Sixth: That the social and individual habits of man are constantly subjected to more sudden transitions and to a greater departure from the laws of his nature than those of any other animal."

"Seventh: As no irregularity of any importance ever takes place in the first set of teeth, it may be readily conceived that the derangement of the second set is frequently occasioned by the too tardy absorption of the roots of the infant, or milk teeth, from whatsoever cause this nonabsorption may result; for if the first or shedding teeth are not removed at the proper period, the teeth of the second or permanent set will be forced out of their true position and compelled to take up their station either within or without the natural arch."

"Eighth: No other portion of the human physical system is found to be as

subject to constitutional and accidental malarrangement and disorder as the organs of mastication."

"If irregularity of arrangement and the unseemly appearance, consequent thereon, were the only ill effects of this deviation from the laws of nature, the philanthropist would find less reason for sympathy, and the professional dentist less apology for urging the importance of the subject; but the truth should not be concealed, that a very considerable proportion of dental diseases result from this single source."

"The difficulty of removing tartar and other foul accretions consequent upon this jumbled condition of the teeth, would of itself constitute a powerful objection to this state of the mouth; but this is one of the smallest difficulties. When the teeth lose their natural arrangement, they also lose their natural support. The form of the arch assumed by the teeth in their natural position, operates as a powerful means of keeping them in place in spite of the great mechanical force to which they are subjected in the act of mastication."

"Ninth: All these evils may be counteracted by the application of remedies well settled among the established principles of dental science in its present improved condition, in our country."

"It might not be deemed an attribute of wisdom to utter useless complaints in regard to the incurable maladies incident to human nature. To bear them with unrepining fortitude would be the true philosophy. But inasmuch as the evils of which we speak are not unavoidable in their character, nor attended with much expense or suffering in their complete removal, I may be allowed to awaken all the solicitude in the minds of my readers, which the importance of the subject demands; and I may ever with the strictest regard to truth, that few subjects connected with merely the physical well being of man, demand more justly his solicitous regard."

"The age of fourteen or thereabouts, at which epoch the permanent teeth become fully developed, is the period at which the operation of regulating the teeth should be fully completed; yet in case of unavoidable neglect or thoughtless procrastination, many writers tell us that the age of eighteen or even twenty, is not wholly beyond the range of successful operation."

O. Thon, in "*Von der Verschieden Abweichungen in der Bildung der menschlichen Kiefer und Zähne*" (1841), made the following observations concerning the position of the teeth, classifying them as follows:

1. Teeth in irregular positions.
2. Teeth out of alignment.
3. Impacted teeth.

In regard to the arches:

1. Projection of upper jaw.
2. Projection of lower jaw.
3. Projection of upper teeth.
4. Projection of lower teeth.
5. Projection of teeth associated with hair-lip or cleft palate.
6. Open bite.

J. M. A. Schanche (1841) "*Precis sur le redressement des dents*," etc., follows closely the idea of his countryman Lefoulon. He describes the development of the teeth, their eruption and the procedure of the eruption of the per-

manent teeth. He, like many of his contemporaries, did not favor the extraction of the deciduous teeth, but did not agree with Lefoulon that the arch narrowed on account of this.

Schange mentions three ways of obtaining space in correcting irregularities. First, by filing, which he disapproved of. Second, extraction, which allows too much space. Third, by the enlargement of the arch.

He also devised a form of anchorage, a marked improvement over the crib of Delabarre, because of its simplicity and smaller size. It consisted of pieces of wire or narrow strips of gold bent to conform closely to the necks of the two or three teeth that is surrounded, with a spur attached to rest on the occlusal

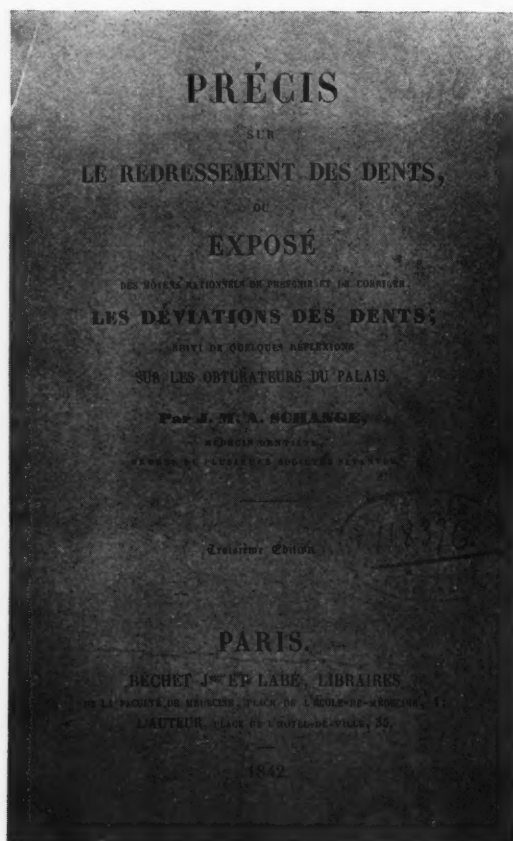


Fig. 7.—J. M. A. Schange, 1841.

surfaces. This space was used primarily to prevent the crib from slipping and irritating the peridental membrane. It thus served a different purpose than the one of Delabarre, in that it was not intended to interfere with occlusion, but for the purpose of anchorage, and in securing the ligatures.

Schange also described three kinds of ligatures—silk, linen or grass line, and fine platinum or gold wires. He was not in favor of metal ligatures, on account of the difficulty of attachment, but preferred the silk or grass line, for they absorbed moisture and required little attention.

Numerous appliances were devised by Schange. In connection with these, mention must be made of the screw as used by him. For the first time, we find

the screw applied in regulating appliances on a clamp band, although having been used previously, in direct movement of the teeth, as a threaded wire by Delabarre; by Lintott, Carabelli, and others. "The honor of the introduction" (of the screw) "of which has been erroneously divided between Dwinell of New York, Gaines of England" and Schange of Paris.

Fig. 8 shows the anchorage used by Schange with a lingual hook.

Fig. 9 illustrates Schange's crib with a palatal wire and plate, showing one method of correcting protrusion of the upper anterior teeth.

Fig. 10 is a modification of the crib, with buccal and labial arch, or band as it was then called, a combination of the screw and ligatures.

Fig. 11 is another modification of the screw adopted by Schange, but not with much success. This was tightened by means of a watch key.

Fig. 8.

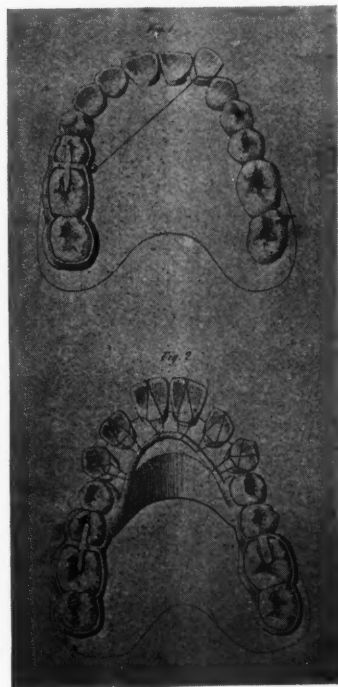


Fig. 9.

Fig. 8.—Anchorage used by Schange, also the introduction of the lingual hook.

Fig. 9.—Crib of Schange.

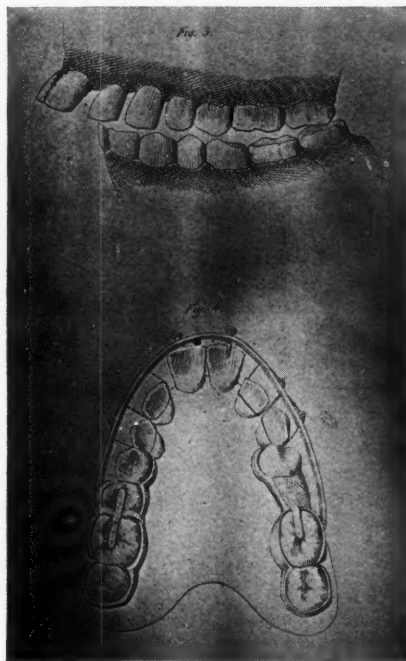


Fig. 10.—Appliance as used by Schange to correct irregularities of the teeth.

Fig. 12 shows the first application of the screw as a clamp band. A marked improvement in the anchorage, although applied to the malposed tooth instead of being used entirely as anchorage. Attached to the lingual surface was a hook, with a ligature of silk brought around the molars and back to the hook. The opposite side shows this same application of the ligature, but attached to the labial surface. Anterior to the molars and over the ligatures were two rings of gold wire. By shoving these rings towards the molars, Schange supposed the rotated central could be turned.

Fig. 13 shows another application of the anchorage with a metal bar extending from molar to molar both buccal-labially and lingually. The external

bar was adjusted away from the teeth in order to apply ligatures. On the inside bar were attached two inclined planes of gold.

Fig. 14 shows Schange's crib, with the first direct application of force against the anterior teeth by means of India rubber. The elastics were fastened upon hooks attached to the crib and applied tightly in front. We thus learn that rubber was used in orthodontic treatment prior to the time of Tucker.

In connection with this appliance, usually credited to Lachaise, but truthfully one of Schange's own, we find the first attempt at retention after the teeth have been moved. In this connection Schange says, "It would be wrong to think that once the teeth are brought back to normal position, the whole treatment is completed. They must be kept in the place assigned to them, for a long time

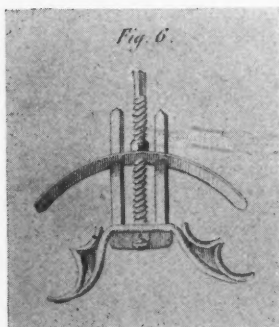


Fig. 11.—Modification of the screw by Schange.

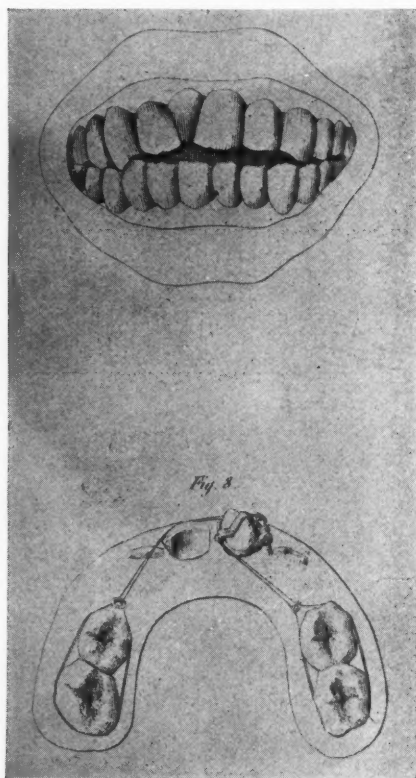


Fig. 12.—First application of the clamp band and another modification of the screw.

after treatment, in order that they may acquire the proper firmness, especially if the treatment has progressed for a considerable length of time. For this purpose I use a rubber band attached to some hooks on the appliance surrounding the molars. This little apparatus was suggested to me by Dr. Lachaise,—and completely served my purpose."

J. S. Gunnell, in the *American Journal of Dental Science* (1841) reported (p. 65) "A Remedy for the Protrusion of the Lower Jaw." Under Kneisel, we have already described the use of the chin cap, and he perhaps was the first to describe the use of same for the treatment of protrusion of the mandible. Nevertheless, Gunnell lays claim to having used this method as far back as 1822, at the suggestion of H. H. Hayden.

Occipital anchorage obtained from the use of the head gear, for the protrusion of the mandible, we find was thus introduced by Kneisel, although used by Gunnell in 1822 or 1823, then by Schange and not by Kingsley in 1886. The first application of the chin-cap was by Cellier in 1802 and Fox in 1803 not as an anchorage but "to prevent accidents from happening in the extraction of teeth."

"About the year 1822 or 1823 my attention was called to the necessity of some plan, whereby the protrusion of the lower jaw (called jimmer or morose jaw) should be restored to its proper situation so that the under teeth (in front) would close under and posterior to the upper ones, thereby forming or restoring natural appearance of the human mouth. I found in all such cases that by the strongest sufferable pressure with the hand on the chin, the jaw could not be pressed back so as to bring the under teeth into their natural relative position to the upper ones. I set about discovering some remedy more convenient and expeditious than any then known."

"In a conversation I had with Dr. H. H. Hayden, about the above period,

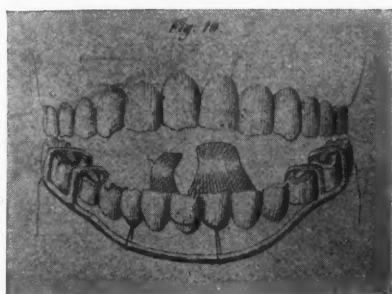


Fig. 13.

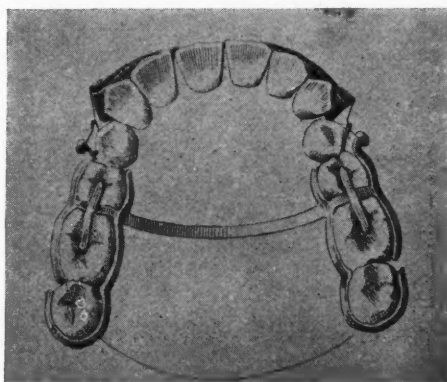


Fig. 14.—First direct application of force by means of India rubber. This apparatus usually credited erroneously to Lachaise.

he advised pressure by straps, extending from the chin to the back part of the head, etc.; but finding them very difficult to retain in place, I determined to use Mr. Joseph Fox's bandage, or cap and straps, which he used for the prevention of the sudden luxation of the lower jaw from gaping."

"The protrusion of the lower jaw, or natural partial luxation, if I may use the expression, sometimes occurs from nature's imperfect operation, but seldom takes place before the cutting of the second set of teeth, though I have seen it exist in several cases previous to that period."

"But the most common time for the occurrence of the protrusion of the lower jaw is soon after the commencement of second dentition. It is caused at this period by the teeth coming out irregularly so that the teeth of the upper jaw strike upon or just inside of the edge of those of the lower. The consequence is, that when the jaws are brought together the lower jaw is forced forwards, producing partial luxation at the temporo-maxillary point. This can be entirely prevented by timely extraction of the infant teeth, and pressing the adult teeth in their proper places, etc."

"To restore the jaw thus deformed, I proceed by tying a small block of ivory on one of the lower jaw teeth, so as to separate the teeth in front about one-quarter or one-eighth of an inch. I then put on Fox's bandage, and buckle or draw it as tight as the patient can bear with convenience, which produces pressure on the chin upwards and backwards, and then in case the teeth are irregular take a piece of tough wood of the shape of a narrow spoon handle, introduce it between the teeth, and press it on the outside of the front lower protruding tooth or teeth and on the inside of the upper irregular teeth, firmly for from five to ten minutes, two or three times a day, the lower end of the stick or piece of wood and the hand being below the chin, thereby pressing the lower teeth inwards and backwards, and the upper teeth outwards and forwards. In this way I have restored the face or jaws to their proper symmetry in one week, though occasionally it will take from three to six weeks or even longer."

"The operation of the bandage or cap and straps and block of ivory, is to press the joint ends of the lower jaw backwards and downwards, and press the chin backwards and upwards, the block of ivory between the back teeth or molars acting as a fulcrum."

"This operation is best performed as soon as the deformity occurs, though it is performed with great certainty until puberty. And I have resorted to it much later, but the difficulties increase very much after the patient is sixteen years of age."

*(To be continued.)*

## **DEPARTMENT OF DENTAL AND ORAL RADIOGRAPHY**

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### **A COMPARATIVE STUDY OF THE ATTACHMENT OF THE TEETH OF LOWER ANIMALS**

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**I**N the study of the evolution of the dental apparatus, there is no feature more interesting than the process of attachment which the teeth of the lower animals have passed through up to the present time. The attachments of teeth as we find them in existing animals may be considered to be the form which is better suited to the animal's need at the present day than some of the attachments which existed in times past.

In studying these various tooth attachments, it must be remembered that the dental apparatus of the animal has played a very important role in the preservation of the animal's life. It must also be remembered that the attachment of the teeth has, to a certain extent, been influenced by the type of the tooth, the manner of tooth forms, and the usage of the tooth. In other words, an attachment which has been found perfectly satisfactory in one animal would be a decided failure in another. Therefore, in the study of tooth attachment, the fact must not be lost sight of that the attachment of the tooth is, to a certain extent at least, subservient to the use to which the tooth is put, as is also the manner of eruption or growth of that tooth. In other words, some of the animals in which a certain type of tooth attachment has been extremely successful have managed to get along with that kind of attachment because other factors entered into the perfection of the dental apparatus. In fact, if space would permit, it would be very easy to prove that the entire life of the animal at some stage, if not at the present time, has been dependent entirely upon the dental apparatus, associated with which have been several forms of tooth attachment.

In studying the attachment of the teeth as found in the modern animals, we must remember that forms of tooth attachment have probably existed which have been intermediate steps in the forms that we have today, and probably some types have entirely disappeared owing to the unsatisfactory conditions prevailing at that time. Therefore it would not be difficult to imagine that during a short period in ancient times certain animals existed in which the tooth attachment was not satisfactory to their needs. Consequently such animals have disappeared and we find only a few of them as fossil remains. In some of the fossils, we have found tooth attachments which are dissimilar to any existing at the present time.

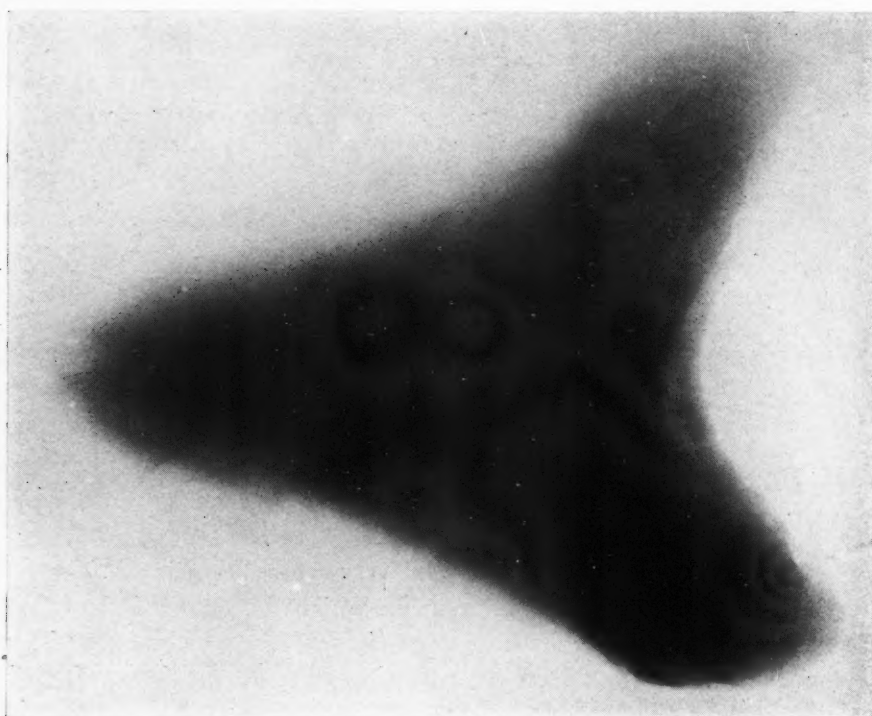


Fig. 2.  
Radiographs of teeth of shark.



Fig. 1.

It is our intention in this article to confine ourselves to the discussion of modern living animals and show how the radiograph reveals the anatomical structure very satisfactorily and, of course, does not mutilate the anatomical structure.

Fig. 1 is a radiograph showing the teeth of a shark attached by fibrous

membrane. In tooth attachment and plan of tooth succession, the dental apparatus of the shark represents a very primitive type. The teeth of the shark rise in continuous succession and are developed from the thecal fold and are of continuous numbers. Consequently, we find the fibrous membrane attachment a success because the teeth are held insecurely to the cartilaginous jaws, and, if one or two, or even fifteen or a hundred, are pulled out, say on Tuesday, they will have a new row of teeth for use ready by Thursday. Therefore, the real success of the shark's dental apparatus does not depend upon the type of attachment but upon the continued succession of teeth. This is one example where a certain type of tooth attachment is successful in one animal, but which would not apply to the higher animals that have a limited number of teeth.

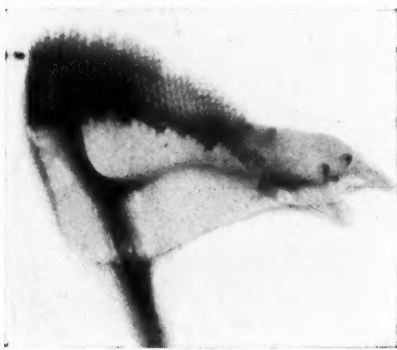


Fig. 3.

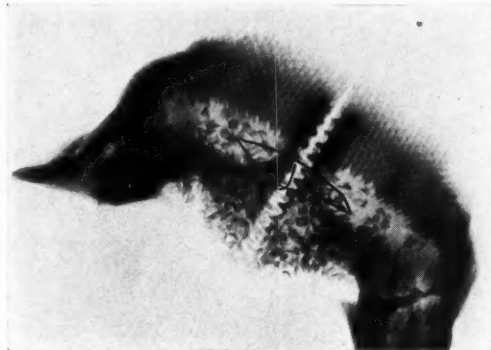


Fig. 4.

Radiographs of upper and lower dental apparatus of scaridæ.

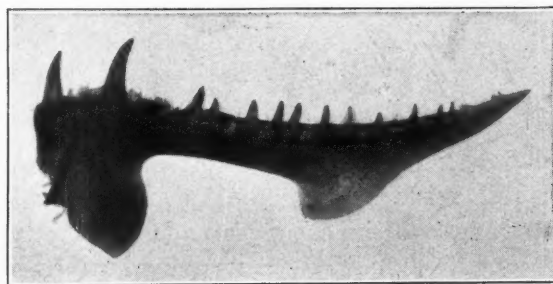


Fig. 5.—Radiograph of dental apparatus of wolf-fish.

Fig. 2 is a radiograph showing the shape of the base of the tooth of an extinct shark, which is imbedded in the fibrous membrane. The teeth in this case were, of course, lost in large numbers during the life of the shark.

The teeth of the shark also represent a type of dental evolution in which all the teeth are of the same shape and the animals are known as homodonts, which is a characteristic type of denture found in the fish.

Figs. 3 and 4 represent the upper and lower dental apparatus of the parrot fish, or scaridæ, which also has a type of dental apparatus of continuous succession, and one in which the teeth are all similar. These teeth are also attached by fibrous membranes, and to a great extent these membranes become calcified between the teeth, as a result of which the teeth are developed one upon the other in very much the same manner as a brick wall is made up of bricks

piled up one upon another. The upper row is eventually broken away, and the lower continues to succeed and push the others up, always presenting an incisal edge made up of a large number of teeth. This animal is also a homodont.

Fig. 5 shows the dental apparatus of a wolf-fish, so named because of the two large caniniform teeth situated in the anterior region of the upper and lower arch. It will be seen that these large caniniform teeth present a different appearance than do the smaller teeth, which are located farther back in the arch. The large caniniform teeth are merging into an ankylosed attachment, there being a calcification of the tissue between the tooth and the jaw, forming a sort of a bony network, and it will be seen that the base of the tooth merges into the jaw without any perceptible line between it and the tooth. Therefore, it would appear that the ankylosed form of tooth attachment is the second stage in the evolution of the attachment of the teeth as we find them in the present-day animals.

Fig. 6 represents one-half of the mandible of the gar-pike, which possessed a large number of small teeth, and several large teeth located in different positions on the mandible. From an examination of this radiograph it will be seen that the attachment of the large teeth presents a different appearance from the

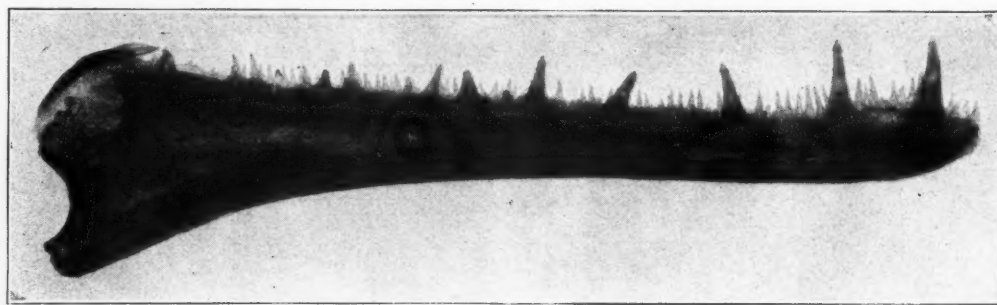


Fig. 6.—Radiograph of half of mandible of gar-pike.

attachment of the large teeth of the wolf-fish; in other words, a slight membranous attachment still exists between the large tooth and the mandible; the tooth is not as firmly ankylosed in the gar-pike as are the two caniniform teeth in the wolf-fish. This proves that there were various stages of evolution between the fibrous membrane and the ankylosed tooth in former times and also that some are existing at the present day.

Fig. 7 is a radiograph of the teeth of the sargus which are all attached by fibrous membranes. This specimen is more interesting because of the heterodontism of the dental apparatus, than of any evolution in the tooth attachment. The posterior teeth are round and are used for crushing, while the anterior teeth are very highly developed into incisiform teeth, which are used for incision by the sargus in securing its food.

Fig. 8 shows the beak of the sawfish in which there are a row of teeth located on each side of the bony projection from the premaxillary bone. These teeth are imbedded in a socket and grow from a persistent germ. The embryonic condition of the root of the tooth is very easily revealed by the radiograph, and the wall of the alveolus of the tooth is also outlined. These teeth are of continuous growth and increase in size during the life of the animal; they continue

to grow larger as the animal grows larger. This represents one of the earliest types of a tooth of persistent growth imbedded in a socket.

In Fig. 9, which is a radiograph of the head of a pickerel, we find two types of tooth attachment. The large teeth which are seen on the mandible are attached by ankylosis, while the teeth on the vomer and palate in the upper jaw are attached by fibrous membrane. The large teeth are used primarily for prehension, while the teeth attached by fibrous membrane on the palate and vomer

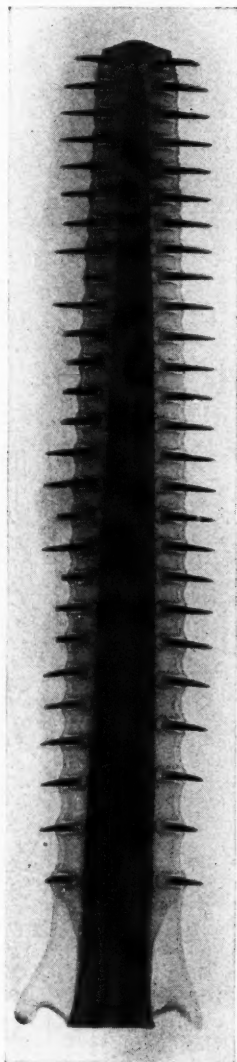


Fig. 8.—Radiograph of beak of sawfish.



Fig. 7.—Radiograph of teeth of sargus.

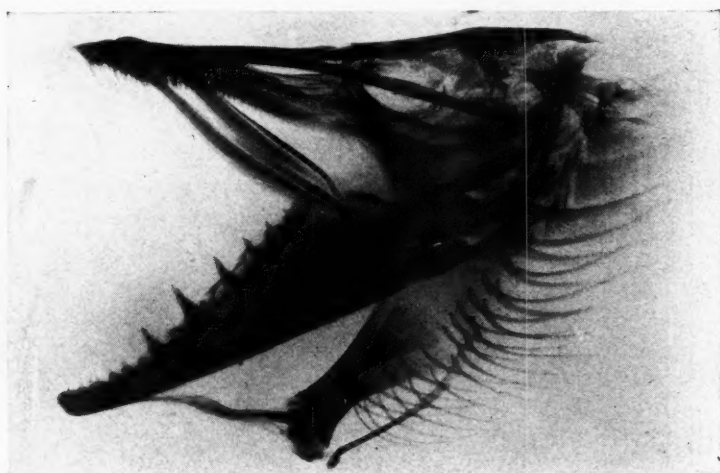


Fig. 9.—Radiograph of jaws of pickerel.

are used for deglutition. This represents another example of the evolutionary changes brought about in the use and position of the teeth. It will be seen that the maxilla is very small and carries no teeth.

Fig. 10 is a radiograph of a skull of a turtle, here shown because it has some interesting features owing to the fact that the turtle is entirely edentulous. Fig. 11 shows the mandible of the turtle, and the mandible and maxilla are covered with a calcareous plate, which performs the dental functions of the animal. This



Fig. 10.—Radiograph of skull of turtle.

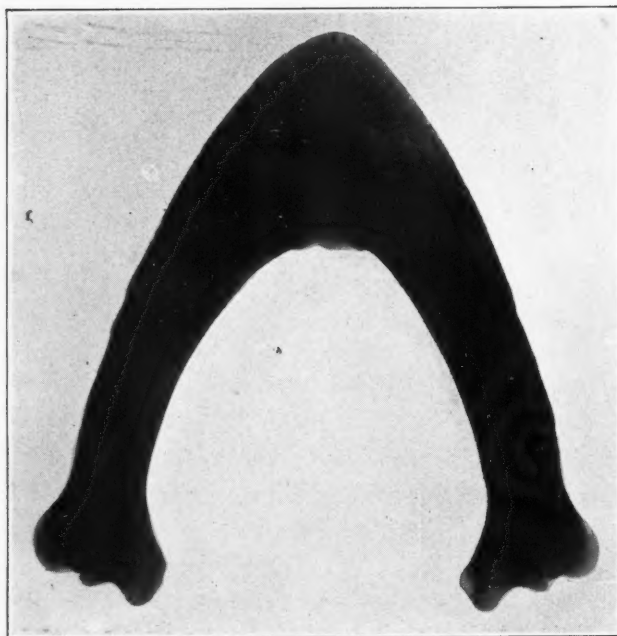


Fig. 11.—Mandible of turtle with calcareous plate removed.

calcareous plate is really attached by a fibrous membrane because in a dry specimen it can be easily removed. Fig. 12 is a radiograph of the calcareous plate which has been removed from the mandible shown in Fig. 11.

The armadilla, a radiograph of which is shown in Fig. 13, has a very primitive apparatus so far as the occlusion of the teeth is concerned. In this species the teeth are conical-shaped and, in shape and form of attachment, very much resemble the teeth of the sawfish; they are imbedded in a socket and have the same diameter at the root as at the crown.

As we pass higher in the animal kingdom, we find that the teeth of the



Fig. 12.—Radiograph of calcareous plate of mandible of turtle.

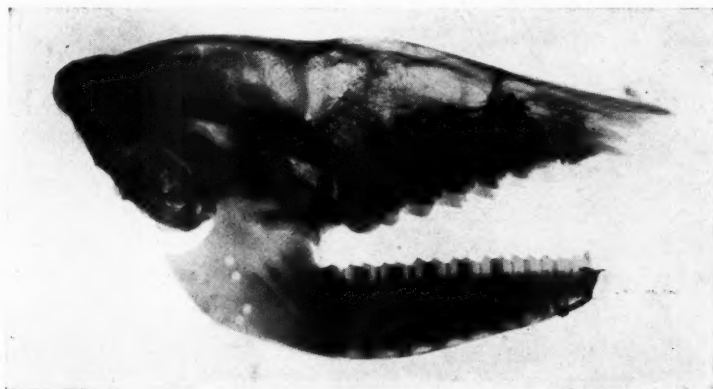


Fig. 13.—Radiograph of skull of armadilla.

animal become more complicated as regards both tooth attachment and form of the dental apparatus. As to the zoological classification of an animal, it might be said that the entire anatomy does not necessarily progress with the dental apparatus. An example of this is the kangaroo, a radiograph of the teeth of which is shown in Fig. 14. The kangaroo has a very highly specialized dental apparatus both as to the shape of the tooth and the manner of tooth attachment. In an examination of the mandible, it will be seen that the lower incisors are set horizontal to the body of the mandible, with the cutting edge projecting for-

ward, and the root of the incisor is turned directly towards the molars and premolars instead of being perpendicular to them. The upper molars and premolars are attached in the socket by means of peridental membrane, or by what is known as *gomphosis*. Fig. 15 shows the occlusal view of the mandible and the maxilla of a kangaroo, and the position of the attachment of the lower incisors is also very closely shown.

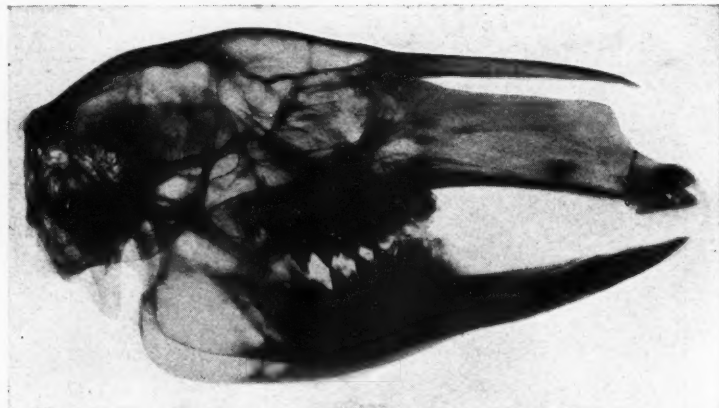


Fig. 14.—Radiograph of skull of kangaroo.

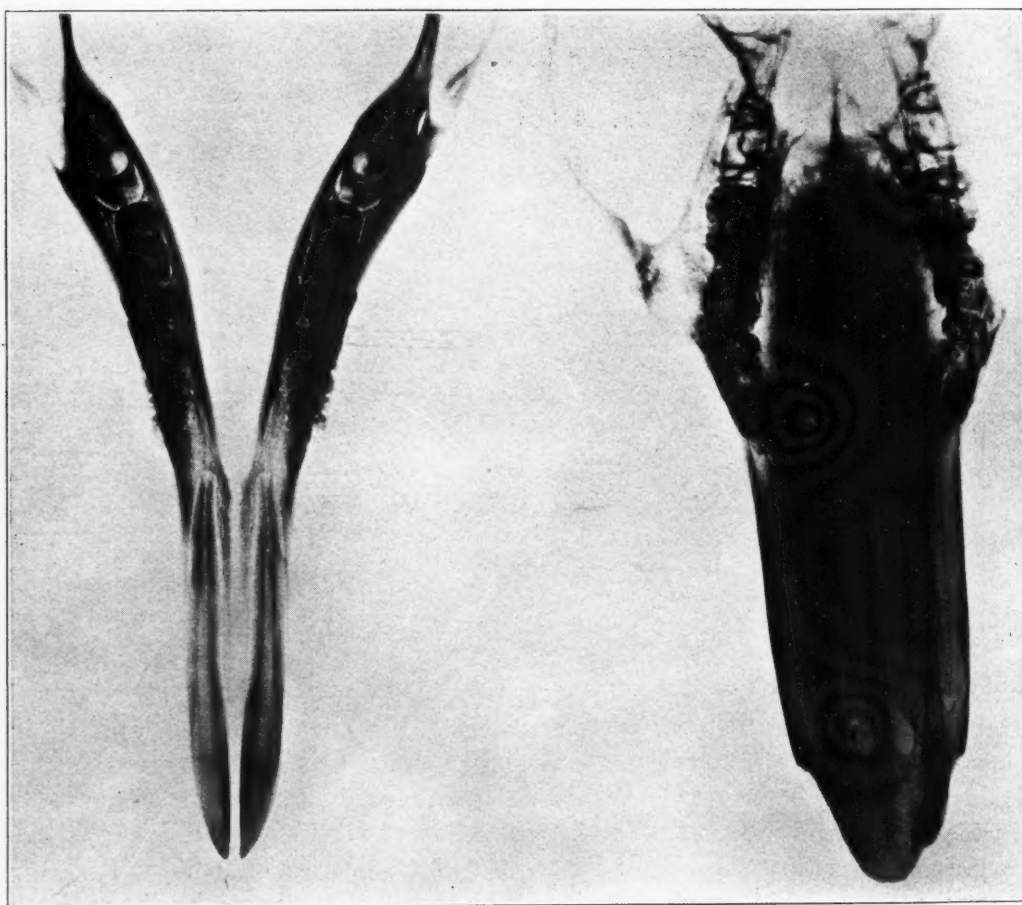


Fig. 15.—Radiographs of mandible and maxillæ of kangaroo.

The teeth of the rodent present a very interesting study of attachment, which is also influenced by the manner of tooth eruption or growth. Fig. 16 is a radiograph of the mandible of a woodchuck in which the large lower incisor grows as the result of a continuous tooth germ. This incisor is imbedded in a socket and the attachment of the tooth continually changes as the tooth continues to grow forward. The upper molars and premolars are attached by means

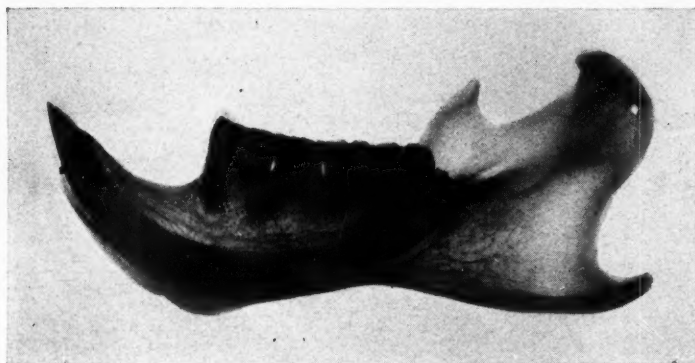


Fig. 16.—Radiograph of mandible of woodchuck.



Fig. 17.—Radiograph of mandible of squirrel.

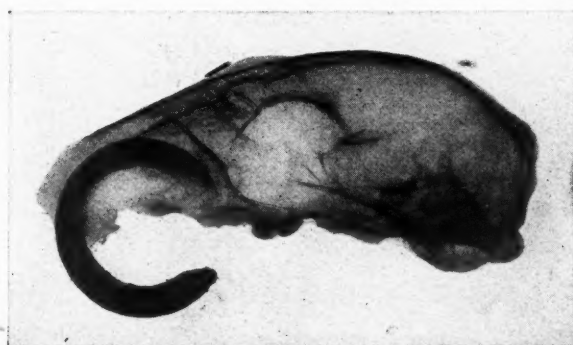


Fig. 18.—Radiograph of skull of squirrel showing excessive growth.

of peridental membrane and a socket, but are not of continuous growth, consequently the attachment is not changing as rapidly as it is in the constantly erupting lower incisor. The radiograph also shows the lines of calcification in the mandible in such a manner as to overcome the stress of tooth and muscular attachment. It is interesting to note that the greatest stress on the point of the lower incisor must necessarily be downward, but as the alveolar process is extremely thin on the labial, or under side, the tooth is really supported by the

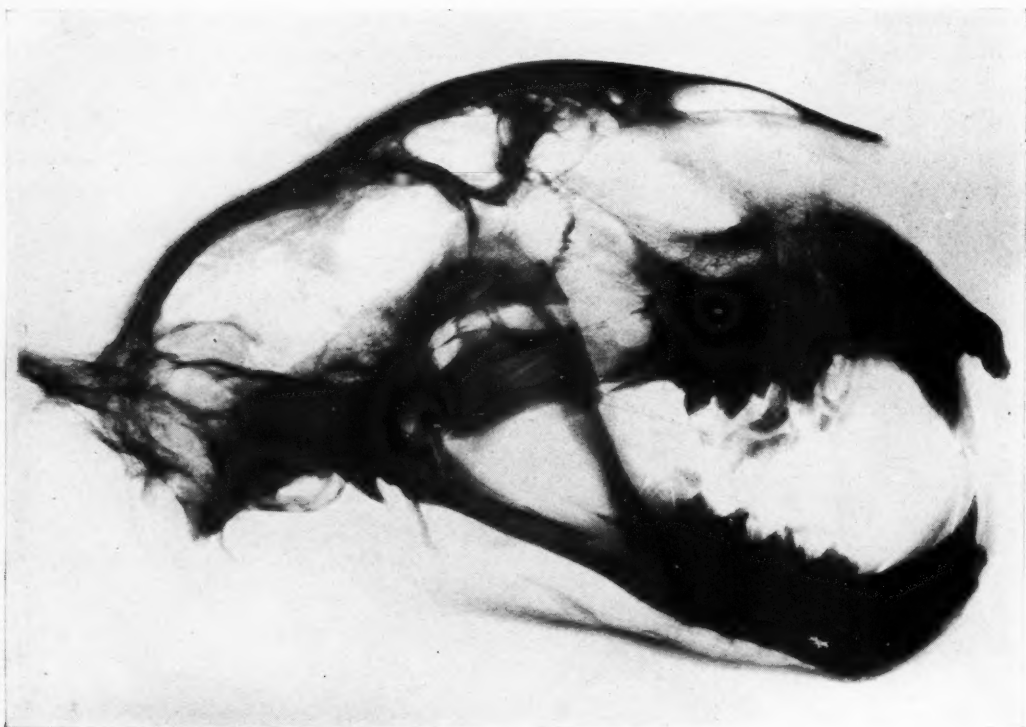


Fig. 19.—Radiograph of skull of mountain lion.

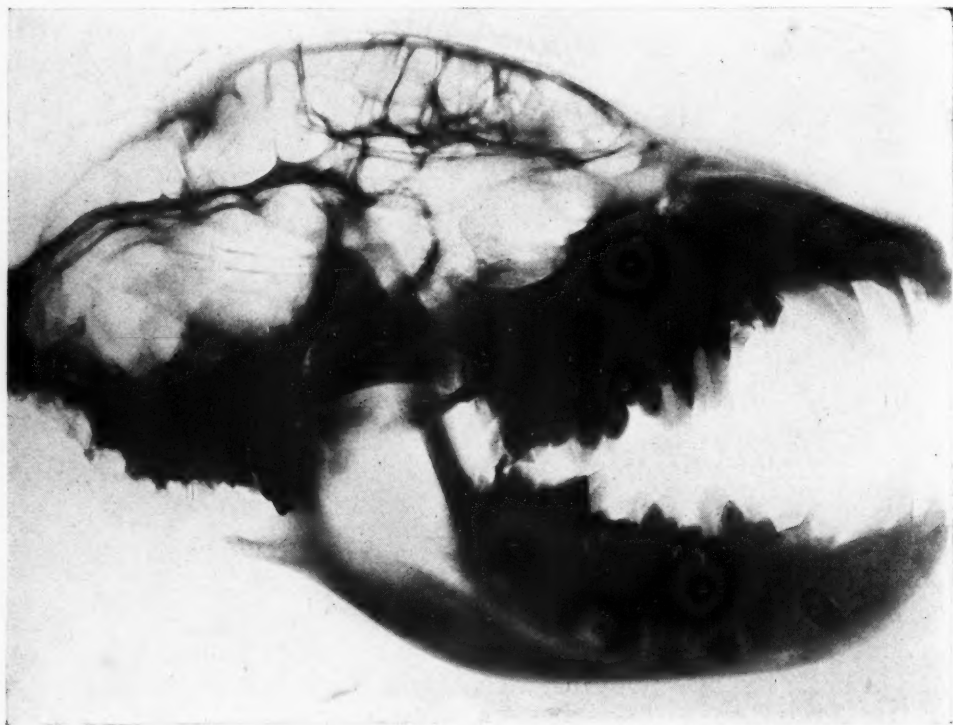


Fig. 20.—Radiograph of skull of hyena.

peridental membrane and the attachment from the upper, or lingual side, and not by the development of bone on the lower, or labial side. The arrangement of the bony structure in this case indicates that the teeth, when attached by

gomphosis, receive their real support from the fibers of the peridental membrane, which are attached to the bony wall, and not from the bony wall independently and separately from the peridental membrane.

Fig. 17 presents not so much a study of a tooth attachment as it does an interesting feature in the growth of teeth, which are of continuous growth. These teeth must possess occlusion and be worn down in order to prevent the condition shown in Fig. 18.

Passing from the rodents to the carnivorous animals (see Fig. 19, a radiograph of a skull of a mountain lion), it will be noticed that the teeth are attached much more firmly because they are subject to a great amount of stress, and are not of continuous growth. Attention is called to the extreme heaviness of the attachment around the molars and premolars and canines in both the

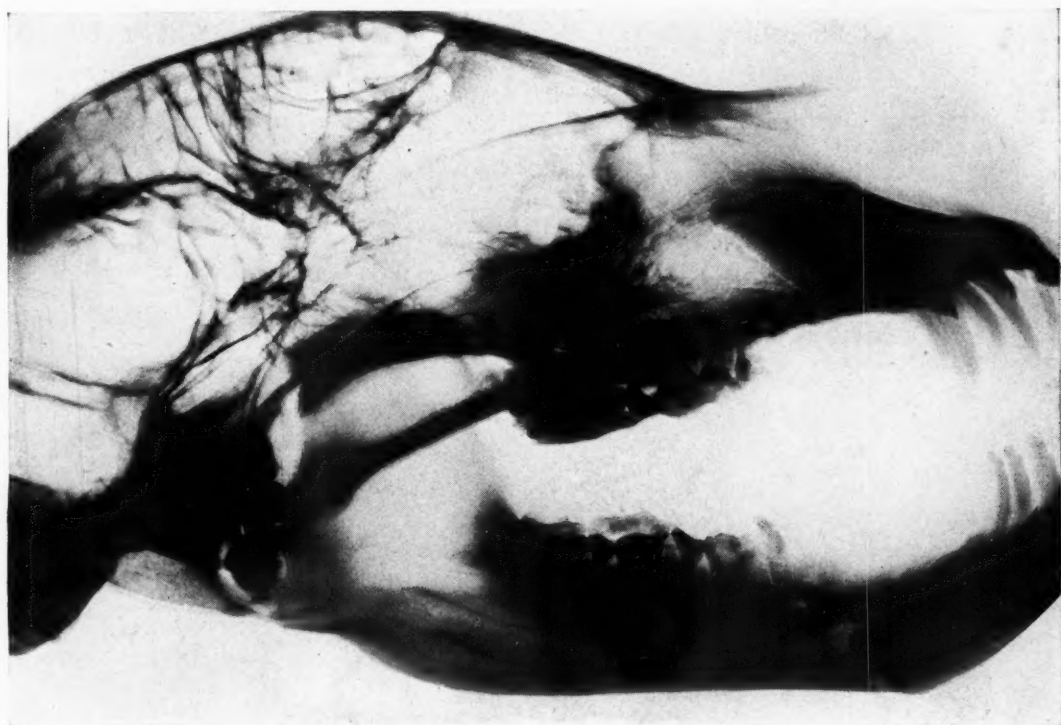


Fig. 21.—Radiograph of teeth of bear.

upper and lower arches. Comparing Fig. 19 with Fig. 20, which is a radiograph of the teeth of a hyena, it will be noticed that the extreme heaviness of the tooth attachment is in the region of the molars and premolars, which are the teeth that are subjected to the greatest amount of stress and use. The canines of the hyena are used very little. They are under-developed and their attachment is much more insecure than that of the molars and premolars, which are used for crushing.

Fig. 21 shows a radiograph of the skull of a bear, which also presents an interesting study from a comparative standpoint when compared with Figs. 19 and 20. Owing to the peculiar food habits of the bear, the dental apparatus of this animal differs considerably from that of the mountain lion or the hyena, and consequently the teeth are of a different shape, and the attachment also

shows a different amount of strength. Because of the omnivorous habits of the bear, the dental apparatus is not as strongly attached as it is in either the lion or the hyena. This difference, or weakness, in attachment can be seen by the manner in which the rays penetrate the teeth and the alveolar process.

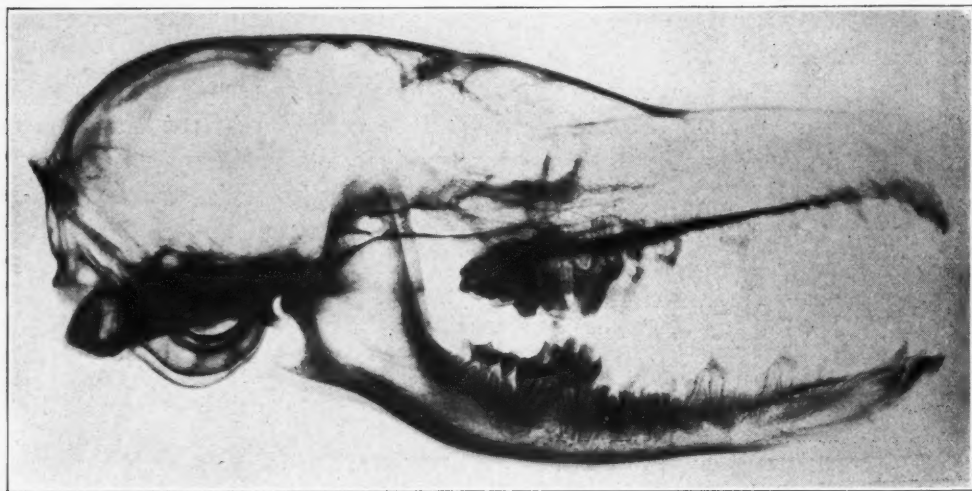


Fig. 22.—Radiograph of skull of wolf.

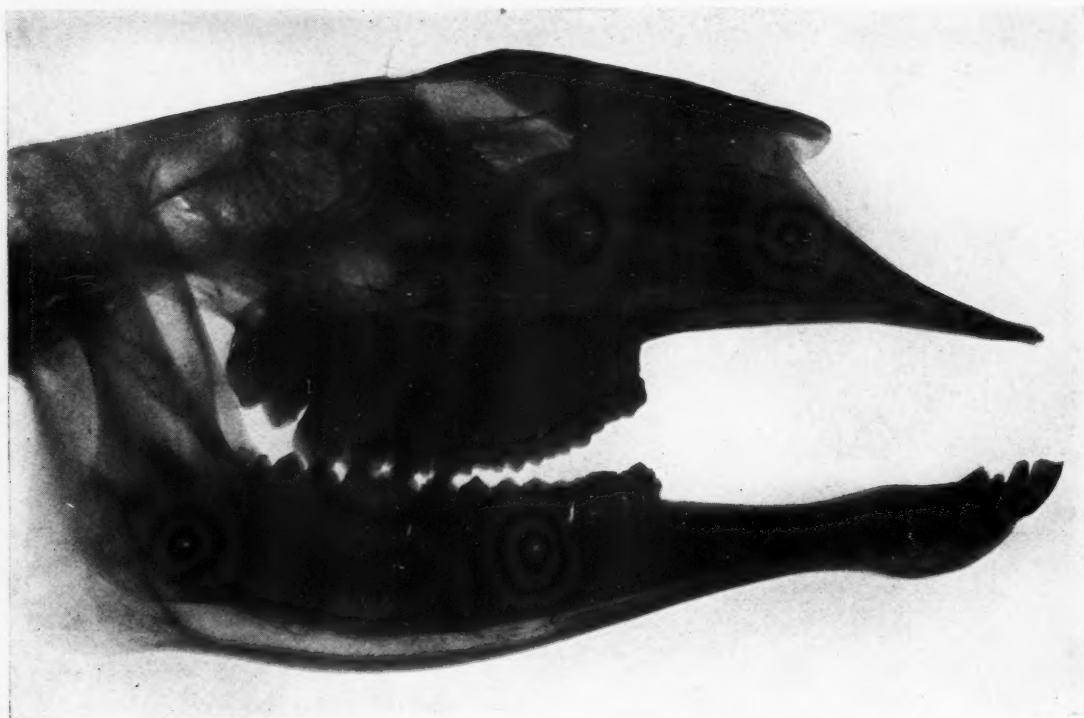


Fig. 23.—Radiograph of an antelope, showing hypsodont teeth attached by gomphosis.

Fig. 22, a radiograph of the teeth of a wolf, also shows a light development of process around the teeth and jaws, indicating that the dental apparatus is not put to any great amount of strain, for the development of alveolar process is exceedingly light.

The herbivorous animals representing that great class of plant eaters of which the deer, antelope, and cow are living specimens, have a tooth attachment which is a modification of that found in the carnivorous animals, or a tooth which is not of continuous growth, and one such as is shown in the incisors of the rodent. The teeth of the herbivorous animals are known as hypsodont



Fig. 24.—Radiograph of jaws of buffalo (*Bison americanus*), showing missing molar.

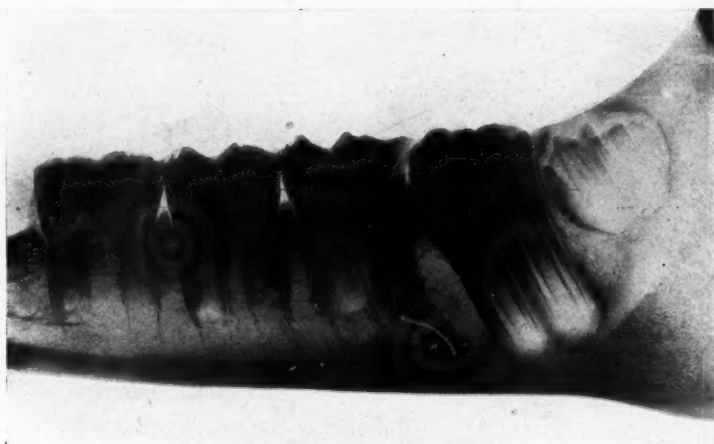


Fig. 25.—Radiograph of mandible of a young horse.

teeth, or teeth which are of continuous eruption. It will be seen in Fig. 23 that the molars and premolars present crowns which are of considerable length, or, in other words, the crown extends down in the alveolar process a considerable distance, and the root is short. The diameter of the tooth is about the same from

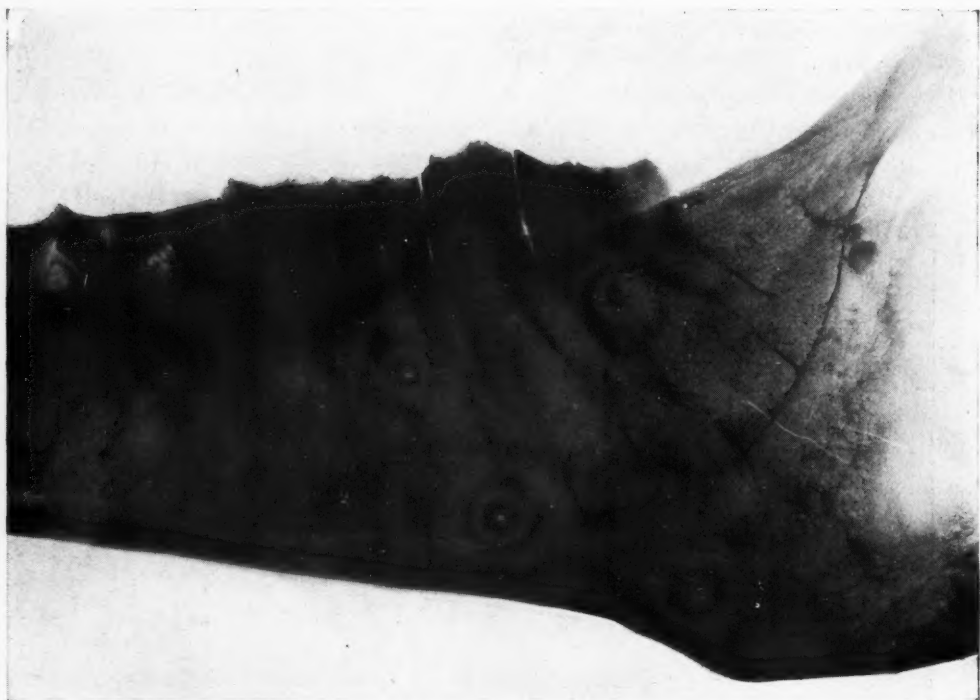


Fig. 26.—Radiograph of mandible of an old horse.

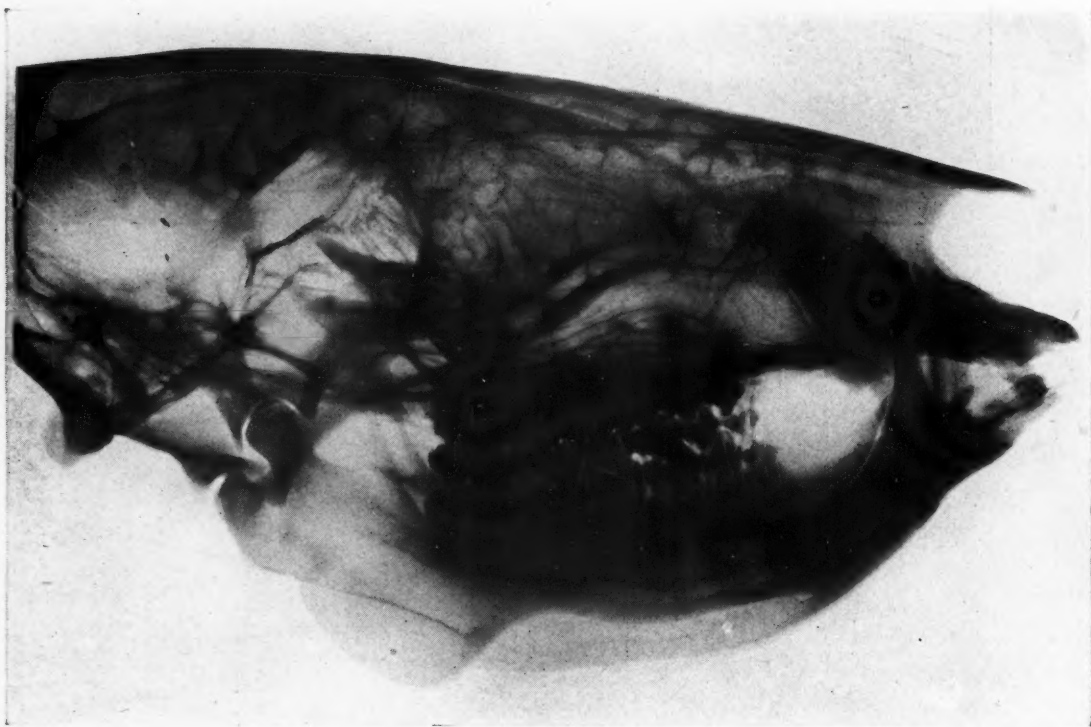


Fig. 27.—Radiograph of teeth of wild hog.

the occlusal border down to the root. As the occlusal surface is worn off, the tooth continues to erupt, and consequently the crown of the tooth continues to become shorter as the animal grows older. An example of this form of tooth

attachment and the continuous eruption of the tooth is shown in Fig. 24, which is the mandible and maxilla of a buffalo that had lost one tooth above, and the lower tooth continued to erupt without the subsequent wear which we see on the other teeth.

As an example of the continuous eruption of the teeth, Fig. 25, the mandible of a young horse, shows the permanent molars in a state of formation at the apical end, and the extreme length of the crown of the tooth as it is first formed. As the animal grows older, the teeth continue to erupt, as shown by the radiograph of the teeth of an old horse (Fig. 26), and the lines of calcification of

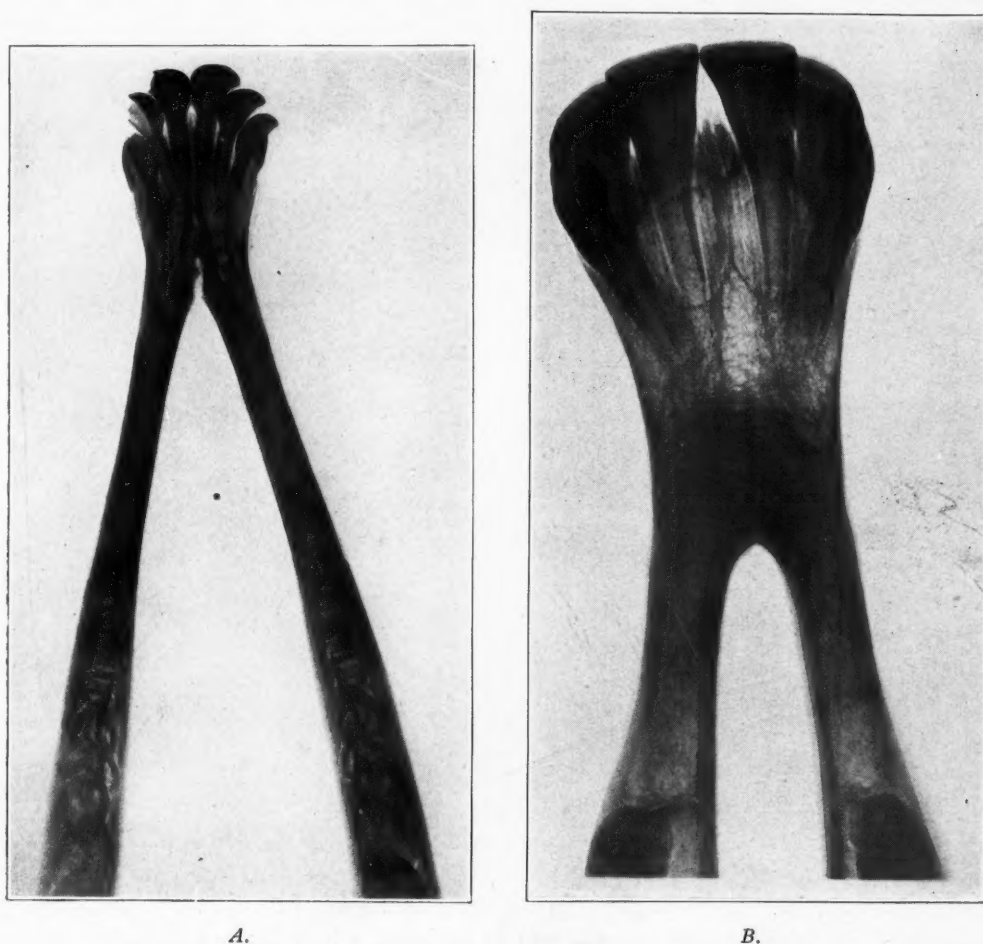


Fig. 28.—A, Radiograph of mandible of antelope; B, Radiograph of mandible of horse.

the original tooth socket can be very easily seen. The amount of bone filled in as the result of the eruption of the teeth can also be outlined very clearly.

Fig. 27 is a radiograph of the teeth of a wild hog, which shows very nicely the occlusion and the heavy attachment of the process around the region of the canine.

Fig. 28 presents a comparative study of the attachment of the teeth of an antelope and a horse, the figure on the left being that of an antelope whose teeth occlude with a fibrous pad on the premaxillary bone. As the result of this oc-

clusion, very little stress is brought to bear on the lower incisors. During the process of eating, the grass is caught between the lower teeth and the fibrous mat of gum, and pulled off rather than cut off. The lower incisors of the horse occluding with the incisors of the upper jaw are necessarily exposed to more wear, and the form of tooth attachment is more secure, or the alveolar process is more firmly developed in the region of the tooth to support those teeth than it is in the teeth of the antelope.

Fig. 29 shows a comparison between the woodchuck, which is the upper picture, the mountain lion, which is the middle picture, and the antelope in the lower. The lines of calcification in all three mandibles and the manner of the development of the bone that supports the teeth are very clearly shown.

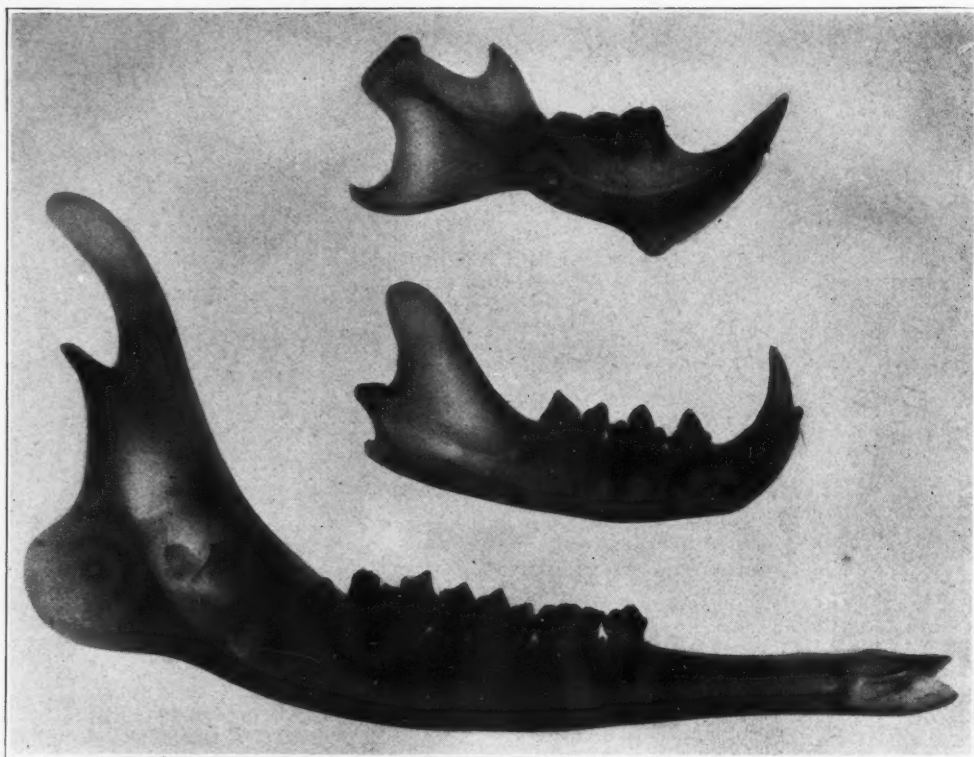


Fig. 29.

As a result of these studies, we have concluded (1) that the attachment of the tooth is closely related to the use to which the tooth is put and the amount of stress which is brought to bear upon it, (2) that the greater usage to which a tooth is subjected, the firmer will be the formation of the attachment than is found in those teeth which are very seldom used, and (3) that the tooth is supported through the fibers of the periodontal membrane in the higher mammals and that the bone is developed on the opposite side to which the tooth is being forced, or, in other words, as is illustrated in the incisors of the rodent (Fig. 29), the stress on the lower incisor would displace it downward; but the heavy development of process is on the lingual side. The development of bone, shown below the lower incisor, is intended not so much as a support to the tooth as it is to form the junction or articulation between the two halves of the mandible.

## A SYMPOSIUM ON DENTAL RADIOGRAPHIC TECHNIC\*

BY FLOYD D. LEACH, D.D.S., CHICAGO.

A FEW years ago, Dr. Hunter published in the *Lancet*, an article criticizing more or less justly the efforts of the American dentists in their attempt to restore the lost organs of mastication by the placing of crowns and bridge work in the mouths of many of the patients who came under their observation.

Dr. Hunter may have had in mind the uplift of the dental profession, for immediately upon the publication of this paper, the American dentist, being somewhat aggressive, began looking around for material in the defense of his work.

In so doing he was surprised and chagrined to find that much of Dr. Hunter's criticism was well founded, and straightway, the question of how to remedy this evil was paramount in dental circles.

*The dental röntgenograph came to his assistance.*

About this same time the medical profession was being placed in possession of facts concerning the relation of foci of infection to general systematic conditions, and by the wonderful research works of Drs. Billings, Rosenow, Davis and others, began to realize that the oral cavity with its complicated and delicate equipment, might be a source of infection.

*So, again the need of the dental röntgenograph as an aid to diagnosis.*

Previous to this time, in only those dental conditions which were more or less obscure was it thought necessary to make röntgenographs, while today many of the dentists who are trying to practice dentistry to the very best of their ability and resources are using the röntgenograph in their daily routine, the simplest cases as well as the more complicated ones being observed.

With the need of this branch of the work so apparent, every operator is called upon frequently to make röntgen examinations for dental and other lesions, and in order that his work may be above criticism, and results more uniform, a systematic procedure should be followed.

Again, the operator should have a good working knowledge of dental anatomy, histology, pathology and nomenclature, that he may be able to give an intelligent diagnosis.

First, as comprehensive a history as possible should be obtained, either from the doctor referring the case, or from the patient. A preliminary ocular and digital examination should be made which will greatly assist in the final interpretation of the results, as well as aid in placing the films during the röntgen examination.

Dr. E. J. Eisen of Milwaukee, Wisconsin (now deceased), used a system of examination which covered the case in hand so extensively that minor details did not escape notice, which might otherwise be overlooked, thus leading perhaps to some misstatement or error in diagnosis.

A chart of the mouth was used, and on this was noted, in their respective positions, all crowns, bridges, large amalgam, gold and cement fillings, also missing teeth.

\*Read before the Chicago Roentgen Society, Feb. 18, 1916.

With a small Faradic battery, each tooth was tested for the life of the pulp, the result as to vitality being recorded on the chart for each particular member. Where necessary, the thermal test was made.

With this chart at hand during the interpretation of the films, the operator has brought to mind the existing conditions in the mouth, which with the history, enables him to cover the description thoroughly.

The digital examination consists in going over with the fingers, the investing tissues and alveolar process supporting the teeth on the buccal, labial and lingual surfaces, noting the inclination of roots, the condition of the floor of the mouth as to the laxity or tenseness of the tissues, and the attachment of the muscles, whether high or low.

Careful attention should be given to the hard and soft palates as to the relative size and height of the vault, and especially determining to what distal point the patient can tolerate the film without being nauseated.

In some few cases this same condition has to be taken into consideration in dealing with some of the lower posterior teeth.

These procedures may seem superfluous to some, but as we are dealing with structures (the gross anatomy of which is quite minute) and as the results are to be passed into the hands of men who are working with these tissues constantly and are more or less particular as to small details, we should endeavor to perfect our work to a point where it would be beyond their criticism. Not knowing the conditions under which we have to work in some cases, the medical and dental professions are prone to condemn rather than commend our efforts.

The position of the patient is a question which must be determined by the operator to suit his own convenience. Personally, I have used only the upright, while some will prefer the prone dorsal position.

Considering the ordinary mouth, a general survey can usually be made in ten exposures, using the Eastman  $1\frac{1}{4} \times 1\frac{5}{8}$  inch films, five on the upper, and the same number on the lower arch. In some mouths it may be necessary to use 12 films, while in a few favorable cases the number can be reduced to eight by the use of  $1\frac{5}{8} \times 2$  inch films.

In order that the shadow of the dental structures may be of about normal size, a target film distance of from 12 to 16 inches should be used. A greater distance is unnecessary and cuts down the efficiency of the ray, while bringing the target nearer than 12 inches generally produces indistinct outlines and lack of detail of these small tissues.

Length of exposure will be variable, depending upon the efficiency of the equipment, sensitiveness of the film, density and thickness of the part to be subjected to the ray.

Using Eastman positive films, an 8 K. W. Victor Transformer on direct current, and an ordinary gas tube which will back up a 5 inch spark, the author finds that exposures of from 3 to 4 seconds will do the work in the general survey of the ordinary mouth.

The placing and holding of the film is quite a problem in many cases. Having this done by an assistant would be ideal, but we all know what the result would be if this practice were continued indefinitely. The film held by the finger

of the patient is being used almost universally for the lack of a more convenient means.

The wire holders which are manufactured by the Victor Electric Company will help solve this problem materially, as they not only hold the films firmly, but prevent its bending and distorting the shadows. They are not bulky, and the operator is enabled to see clearly where and in what plane and angle the film is being placed.

One of these holders is to be used for the molar and bicuspid regions of the upper and lower, diagonally opposite sides of the mouth, and the other is to be used for the anterior teeth in both upper and lower arches.

The question of the angle of the ray in relation to the part under observation, together with the plane in which the film is set, I dare say, accounts for the greatest percentage of failures due to distortion of the shadows. It would be safe to say that it is almost impossible to produce a röntgenogram of the teeth of the upper arch which is entirely free from distortion. This is true also of the lower anterior teeth, and especially the cuspid and first bicuspid.

In the lower molar and second bicuspid region it is comparatively easy to place the film in a plane nearly parallel to the long axes of the teeth and to direct the rays so they will penetrate at right angles to both the part and the film, producing a result which is nearly normal.

A careful study of the case in hand, and knowledge of anatomy of the parts will assist greatly in making better röntgenograms of these difficult areas, always keeping in mind that experience and perseverance are two great aids.

In making observations of the teeth of the upper arch, try to set the film so that the upper edge is in close contact with the tissues, allowing the opposite edge to stand slightly away from the crowns of the teeth, thus bringing the plane of the film nearly parallel with the teeth in their entire length. This will help materially in overcoming the elongation or foreshortening of the shadows.

The method of development and subsequent handling of the films is best determined by the operator, as most of us have our own technic well established.

When the patient cannot tolerate the film because of nausea, the parts can be swabbed with a 5 per cent solution of cocain. Two other remedies which are non-poisonous and can be easily applied are Baume Analgesique, used on a swab, or a solution of Chloretone in water used as a wash and gargle.

Sometimes by getting the patient interested in holding the film either with the finger or with the wire holder, together with breathing through the nose or holding the breath, will in a psychic way, assist in overcoming nausea.

In many instances our best efforts will be criticized severely, but not as a general rule by men who are acquainted with the conditions under which we work. This should be a stimulus and not a discouraging factor, and let us all by patient endeavor and the perfecting of our technic, try to raise the estimation of our work to as high a level as possible, and not allow it to be thought less of and degraded by those who are not willing to aid but are in the field as a purely commercial enterprise.

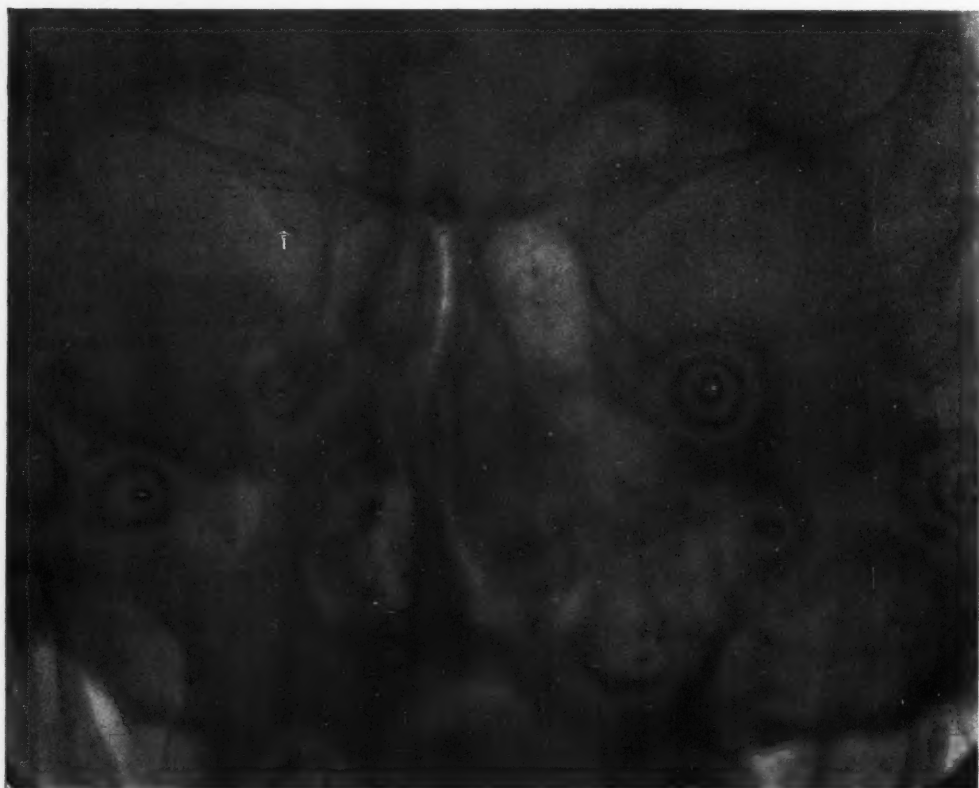
## REPORT OF A CASE OF CHRONIC SUPPURATION OF THE ANTRUM—IN WHICH THE RADIOGRAPHIC EXAMINATION WAS INDISPENSABLE

BY JOHN MACKENZIE BROWN, M.D.

*Lecturer on Rhinology and Laryngology, University of Southern California,  
College of Dentistry, Los Angeles.*

**J.** E. W. Female. Aged 35. Family history negative. History of Trouble.—Sixteen years ago, following an acute rhinitis she developed an acute suppuration of the right antrum which was untreated, and merged into the chronic form. The discharge of pus from the antrum never entirely ceased at any time, but acute exacerbations occurred several times a year. Six years ago, during the course of an acute exacerbation, she consulted a dentist who advised the removal of the second bicuspid on this side for drainage purposes. This was supposedly done, and an opening into the antrum made through which the patient irrigated the cavity twice daily ever since, but with no sign of cessation of the discharge, for as soon as the irrigations were neglected for one day the discharge of pus through the nose would immediately reappear.

Examination of patient showed the absence of the second bicuspid on the upper right side in which the patient wore an obturator, and a probe passed



easily through the opening into the antrum. The nose is apparently healthy except an hypertrophy of both middle and lower turbinates of the right side. On irrigating the antrum, obtained a drahm of pus containing streptococci in predominance with staphylococci and pneumococci. Transillumination shows a very dark antrum. The patient was referred to a radiographer who made the radiograph here illustrated, and shows the presence of a foreign body much like a tooth apparently in the antrum under the superior wall. A Caldwell Luc operation was performed, and a foreign body located as shown by the radiograph, and removed; which proved to be the root of the second bicuspid which was supposedly extracted six years ago. The tooth had broken off and the dentist in his efforts to extract the root had driven it up into the antrum. The bone on the superior wall of the antrum was denuded for a space of about the size of a quarter of a dollar. Why the root had remained in the top of the cavity I presume was due to the patient taking the reclining position after the extraction, and the root lodged at the top and set up an inflammatory condition encapsulating it.

Three weeks after this operation, I am unable to find any discharge from the antrum.

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### X-RAY PLATES MAY BE SHOWN TO JURIES

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THE Supreme Court of North Carolina, in affirming a judgment in favor of the plaintiff for damages for personal injuries alleged to have been caused by having a heavy truck pass over one of his feet, holds that there was no error in permitting a physician who had made skiographs of the plaintiff's feet to exhibit the plates to the jury. It was true that the witness who made the skiographs did not say in so many words that the photograph was an accurate and true representation of the condition of the foot, but this was a reasonable inference from his evidence.

This decision is of interest to members of the dental profession, and is but one of the many future developments in dentistry resulting from the use of the x-ray. Under the circumstances where there is any uncertainty about the treatment, a skiograph is essential both from the patient's and operator's standpoint. Some writers would have us believe that the x-ray is nothing but a "shadow of doubt." However, when the dental skiograph is introduced to a jury it becomes a decided reality, and while it may be a "shadow picture," it will, we venture to think, be considered by the jury as a most important piece of evidence.—*Oral Health*.

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## EDITORIALS

### The New President of the American Medical Association

**D**R. CHARLES H. MAYO, of Rochester, Minn., was elected President of the American Medical Association at its annual meeting in Detroit, June 12-16.

Dr. Mayo needs no introduction to the dental profession. His fame as a surgeon, and the reputation of the Mayo Clinic, of which he is the junior member, is known to every physician and dentist, not only in this country but throughout Europe as well.

It was Dr. Mayo who said a few years ago that the next great step in medical advancement would come from the dental profession. His unerring judgment in this prediction is borne out by present development in dental science.

Dr. Mayo was born in Rochester, Minn., July 19th, 1865, the son of the late Dr. William Worrall Mayo, and Louise Abigail Wright Mayo. He graduated from the Chicago Medical College in 1888, and at once began practice in Rochester with his father and his elder brother, Dr. William J. Mayo, who was president of the American Medical Association in 1906.

Dr. Mayo has frequently been honored by his confrères. In 1904 he was president of the Western Surgical Association; in 1905, president of the Minnesota State Medical Association; chairman of the Section on Surgery of the American Medical Association in 1907; and president of the American Congress of Clinical Surgery in 1915.

Dr. Mayo bears the honors heaped upon him in a manner that is in keeping with his worth as a surgeon and a scientist. With quiet demeanor, and a singleness of purpose, he pursues the even tenor of his way, intent upon one thing—more light on surgical subjects—more ability to serve. His life and achievement is a striking example of the adage that there are exceptions to all rules, because it is said that “a prophet is not without honor save in his own country.” He was born in Rochester—in Rochester he has achieved his greatest success—in Rochester he is best known, most honored, and by its citizens he is most loved.

The dental profession can, with absolute assurance, count upon Dr. Mayo's help when this is needed and sought.

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### State Dental Journals

ONE of the most auspicious signs of dental advancement is the establishment of independent state dental journals. It marks a distinct epoch in dentistry and is sure to mean much to this science. A state dental organization can accomplish much more when it has an independent medium through which to wage its battles for reform and for betterment within its ranks, than where it is forced to depend upon a journal that is subsidized by manufacturers and dental supply houses.

Independence in thought is the life blood to scientific development. Organizations whose purpose is scientific development must let the people whom they are trying to serve know what they are doing, and they must let what they are doing be known in no uncertain manner. This can only be accomplished through the medium of the press. State dental organizations are sponsors for the profession in their respective states, and a profession can rise no higher than its organization.

A journal owned and controlled by the state organization with a vigorous policy for betterment and higher development, will do more to unfetter dentistry and to place it where it rightly belongs among the sciences, than any other influence, save possibly that of taking dental education out of private hands and putting it under the control of universities.

A national journal for any national scientific body is of untold benefit to that body, and indirectly to the people whom that body serves. For a national journal to rise to its greatest heights and render its greatest service, it should be backed up and assisted in its work by state journals. Universities for advanced teaching must be fed by high schools and colleges; Field Marshals, Major Generals and Lieutenants must have Captains and Corporals over the privates in the ranks if the effectiveness of military life is attained.

It is only by comparison that change is noticeable. Ten or twelve years ago there was scarcely a state medical journal in existence—today every state medical society has its own journal, and they work hand in hand with the national organ

of the American Medical Association. Contrast the medical profession in America today with what it was ten or twelve years ago. Compare the status of medical education today with what it was at that time. Who can forget the privately owned medical school of years gone by, grinding out half-baked, unfit pseudophysicians to prey upon a credulous people; who but remember the hundreds of privately owned medical journals that flourished in the long ago for the sole purpose of making some patent medicine manufacturer rich and powerful from his ill gotten gains? There is not one among us today familiar with the evolution of medical education in this country who will say that the state journal has not played a prominent part in bringing about the change, or who would go back to the old order of things medically.

Dentistry has made great strides in America during the last decade, and it is safe to predict that before another ten years have passed, state journals, owned and controlled by the State society, will be the rule rather than the exception. Then dentistry will have a battery of machine guns to back up its heavy artillery. It will have efficient and effective mediums to wage war on the unfit, both within and without its ranks.

You will ask, "how will State journals be supported?" Turn again to the past and you will get your answer. The same problem was met and solved by State medical societies. Your dental dues can be raised so that they will cover all this expense, augmented by clean, ethical advertising.

Right always finds the way. State dental journals are in line with correct dental development in America. Their establishment will be the next forward movement of this science.

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### **The Dental Exhibit at the American Medical Association Convention**

VISITORS at the scientific exhibit of the Detroit meeting of the American Medical Association, June 12th to 16th, were interested in, and much benefited through the exhibit made by the Research Committee of the National Dental Association.

It is safe to say that the visitors who thronged this exhibit will never forget the impression made upon them by this display of mouth infection and the role such conditions plays in disease.

Aside from the benefit the public derived from this, another great object was attained, the narrowing of the gulf between the medical and dental professions. Science knows no boundaries, especially when the object of the science is to benefit humanity by the elimination of diseases and its train of suffering. Dentistry is truly the hand maiden to medicine. The signs of the times point to more harmony and a closer union between these professions. In a few more years, men like Price, Vaughan, Hartzell, Mayo, and Morehead will eliminate the last remaining lines of demarcation between dentistry and medicine.

An intermingling of these sciences similar to that at Detroit, is a long step in the right direction.